THE CHEMIST AND DRUGGIST

OFFICE,
COLONIAL BUILDINGS—44A CANNON STREET, LONDON, E.C.

For particulars of subscriptions, advertisements, &c., see the centre of the book.

THE MONTH

We hope to resume our series of portraits in the next issue.

The Chemists' Ball is to be held on Wednesday next, the 20th inst. Those who intend to go have probably secured their tickets before this, but our memorandum may come just in the nick of time to some husband, father, or lover. This ball is a grand opportunity for any chemist to sacrifice himself for the sake of the lady or ladies of his family. Let him not decide to take her or them to the conversazione next May, and nurse up the idea that that will satisfy them as well. Women have come to see through those conversazioni, with their cold coffee and purposeless perambulations. But balls retain their charm, and will do until women's rights shall have asserted themselves fully, and ladies are independent of the escort of a cavalier. The Chemist's Ball owes its success to its excellent management, which has hitherto always provided the best of music, an elegant supper, and an admirable programme of dances, and doubtless will not fail in these respects this year.

The January meeting of the Pharmaceutical Council was a singularly dull one. It appeared from the report that a communication had been made by the Council to the Commissioners of Inland Revenue respecting the "Morning Tonic" case at Hull, but that no answer had been returned at the date of the meeting. It seems that some discussion on the case took place, but of what nature the official report does not inform us. The case just referred to has been fixed for trial for this day, January 15.

Some more sad cases of accidental poisoning are reported. In one case the housekeeper of a druggist served corrosive sublimate instead of bismuth. The inquiry is not concluded yet, but it seems likely, from the published reports, that a false issue will be put before the jury in consequence of the imperfect knowledge of the Pharmacy Act possessed by the coroner. The Act does not, as that gentleman is reported to have said, limit the dealing in poisonous drugs to persons on the pharmaceutical register. Every legal requirement was apparently fulfilled in this Rathbone Place pharmacy, and the coroner must have misunderstood the communication which he said he had received from the Registrar.

Some prosecutions for selling lemonade contaminated with lead have somewhat alarmed the makers of aërated waters. It is not very certain where the lead comes from. Mr. Chas. Ekin, F.C.S., of Bath, reports a case wherein it was impossible that it could have been derived from the machine; while the water used was proved to be quite free from the metal. He found it abundantly in the citric acid. A correspondent of our own, whose letter appears among our correspondence, says he finds lead in soda water manufactured by himself in a machine which cannot yield any lead unless the gas itself can take it up.

An association of chemists and druggists has been formed at Wolverhampton under the presidency of Mr. W. Fleming. The other officers are:—Vice-President, Mr. R. H. Lowe; Treasurer, Mr. Alexander Gow; Joint Secretaries, Mr. W. Y. Brevitt (Darlington Street), and Mr. F. J. Barrett, F.C.S. (the Hospital); and a council of nine members of the Association and three associates. It is proposed to establish a library, museum, lectures, classes, reading-room, and meetings for the discussion of trade matters. Mr. Stokes Dewson has been engaged as lecturer on Materia Medica and Botany.

An exhaustive lecture on phenol and cresol and the chemistry of these bodies and their derivatives was given by Mr. Bickerdike at the December meeting of the Liverpool Chemists' Association. Much valuable information will be found in the lecture, which we report in this number.

An interesting lecture was delivered lately to the Glasgow Chemists' and Druggists' Association by Dr. John Dougall, on *Zymotic Poison*. In the course of this lecture, which we print in the present number, occurs a clear explanation of the points in dispute between the germ theorists and the believers in spontaneous generation.

The Distribution Committee of the Hospital Sunday Fund has published its report for 1874, showing that the total sum received was 29,678*l.* 13*s.* 2*d.*, being more than 2,000*l.* in excess of the amount collected in 1873.

Among our correspondence will be found an interesting letter, signed "T. B. G., Weymouth," in which an ingenious and novel suggestion respecting the origin of the name "calomel" is hazarded.

The Christmas dinner of the South London School of Pharmacy was celebrated in hearty fashion on December 18, at the Horns, Kennington.

The publication of the "Year Book of Pharmacy for 1874" has been delayed, in consequence, we are informed, of the protracted illness of the editor. We are informed by the committee, however, that it will be ready for distribution before the end of January.

The students of the School of Pharmacy, Bloomsbury Square, have formed an association to be called the "School of Pharmacy Students' Association," the object of which is to promote the study of pharmacy and the sciences on which it is based. The Council of the Pharmaceutical Society have lent a room for weekly meetings, and Professor Attfield has accepted the presidency of the Society. Mr. John Morris Broad, of Hornsey Rise, is Secretary and Treasurer, and all present or past students of the school are eligible for election. The papers to be read are intended to be rather of an educational than of an original character.

A serious fire occurred on Monday night last on the premises of Messrs. May & Baker, manufacturing chemists, Battersea. The loss is estimated at 60,000*l.*

The Custom House returns show that in the financial year 1873-74 there were 14,992 lbs. of chloral hydrate imported into the United Kingdom.

The chemical exports for 1874 were an advance on those of the previous year, though in general trade there is a considerable falling off. The total exports of this country reached 239 millions in 1874, against 255 millions in 1873.

We give a new problem this month in our "Corner for Students." Candidates will be asked to detect one of five alkaloids in some coloured sugar, if any be present, which will be left a question.

CONDUCTED BY RICHARD J. MOSS, F.C.S.

OUR correspondents having greatly improved their acquaintance with the chemical characteristics of morphia, we intend to extend the present system of exercises to other well-known alkaloids. With this object in view we purpose distributing packets of coloured sugar, which may contain any one of the following alkaloids: — Morphia, quinia, cinchonia, strychnia, bruccia. The detection of the presence of one, or the absence of all of these alkaloids is all that is required. It will not be necessary to determine the condition in which the alkaloid exists in the preparation.

Students who wish to compete should send] us their names and addresses before the 20th inst. On the 25th the samples will be forwarded.

Students' papers will be received up to the 15th of the following month.

ANSWERS.

The sugar distributed for analysis in November contained ·5 per cent. of pure morphia, or rather more than twice the quantity of the alkaloid contained in *Trochisei Morphiæ*, B.P. All the analytical statements received record the detection of the alkaloid, with one exception; but only six students discovered the condition in which the morphia was present, while five concluded that it was present as hydrochlorate, two as acetate, and three that opium was present. Those who observed the crystalline residue that remained when the sugar was dissolved in water will be surprised that others should have failed to observe it; but, indeed, several students appear to have thought it quite unnecessary to try if the substance was soluble in water. This was certainly the shortest and least troublesome way of separating the morphia in this case. A few grains of the substance treated with enough water to dissolve the sugar left a small crystalline residue. It was possible to decant the syrup from this residue, treat it with water and again decant, and add one or two drops of alcohol, in which the residue readily dissolved. Now we shall suppose that a small quantity of the material has been operated upon, and that the alcoholic solution obtained does not exceed one or two drops. How is this to be examined for morphia? The following will be found a very satisfactory plan:—Take a piece of white filter paper about an inch in length and about one-eighth broad, and dip one end of it into the solution. Dry the paper, and repeat the operation until all the solution has been evaporated away. The dry paper is now cut into small pieces, which may be placed on a slip of glass for the purpose of applying different tests to them. This may be done by touching one piece of paper with a glass rod moistened with nitric acid, another with ferric chloride, another with starch paste and iodic acid, and so on. Of course the reactions will be definite in proportion to the degree of concentration that has been attained by repeated moistening and drying of the paper; so that it is an advantage to have the paper as small as the skill of the operator will admit. Care should be taken not to scorch the paper when drying it. And in testing the small pieces of paper it is necessary not to drench them with liquid, but just to moisten them by touching one corner with the slightly moistened glass rod. Exceedingly small quantities of morphia can be detected in this way; and this plan of applying colour tests is capable of application to a great number of other reactions besides those of morphia.

PRIZES.

The First Prize for the best analysis has been awarded to THOMAS TAME (T. T.), Market Place, Trowbridge.

The Second Prize has been awarded to H. J. JACKSON (H. J. J.), 11 Prince Street, Bridlington Quay.

Marks Awarded for Analyses.

T. T. (1st prize)	95
H. J. J. (2nd prize)	93
M. M.	80
W. H. D.	78
F. W...	78
W. J. P.	76
Nemo	25
W. A. B.	25
Spero..	23
Waverley	23
H. C. Corke..	20
H.	20
Enitar	20
Non Nullus..	20
C. W. H.	18
J. Bush, jun.	5
C. J. M.	0

TO CORRESPONDENTS.

*** All Communications should include the names and addresses of the writers.

Prizes.—The students to whom prizes are awarded are requested to write at once to the publisher, naming the book they select, and stating how they wish it forwarded.

Any scientific book that is published at a price not greatly exceeding half-a-guinea may be taken as a first prize.

Any scientific book which is sold for about five shillings may be taken as a second prize.

M. M.—The results of your experiments are fairly conclusive under the circumstances, but additional evidence would have greatly enhanced the value of your conclusion.

F. W.—It was not easy to make out exactly what you had done with the substance under examination; try to be explicit. Very little reliance should be placed upon tests applied to the original mixture, without a knowledge of the way in which the sugar and its impurities behave with the re-agents employed.

Nemo.—You omit a very important point. How did you find out that some of the hydrochloric radical was in combination with morphia?

W. A. B.—It is evident that your experiments with amylic alcohol were not conducted with sufficient care, or else your alcohol was very impure. It is better to precipitate morphia with ammonia carbonate than with ammonia, as the latter reagent dissolves a portion of the morphia.

Spero.—Some acetic acid is said to be produced by the action of sulphuric acid in cane sugar.

Waverley.—It may almost appear absurd for us to state that the meconic radical was absent, seeing that you have so elaborately and conclusively demonstrated that it was present. We can assure you, however, that it did not exist in the ingredients of which the substance sent to you for analysis was compounded. It is worth while to verify your observation on the solubility of morphia meconate in amyl alcohol. You should of course ensure the purity of your alcohol. The difficulty of obtaining it pure is an objection to the use of it.

H.—You do not appear to have noticed what we said about chlorides in the sugar when referring to the former analysis.

Enitar.—If you added iodic acid and starch paste to amyl alcohol, it is no great wonder that you did not observe the morphia reaction. The reagents are not miscible with the alcohol.

Non Nullus.—The sulphuric acid test for morphia is very little use in the presence of a large excess of sugar. You may assure yourself of this by observing the behaviour with sulphuric acid.

C. W. H.—When examining the alcoholic extract for morphia with ferric chloride, you obtained a blue colouration; and when testing the aqueous extract for meconic acid with the same reagent you obtained a red colouration. We are curious to know how you induced the meconic acid to keep quiet in the first of these reactions.

J. Bush, jun.—We cannot exactly see what right you had to be of opinion that the mixture contained powdered opium, when you did not get evidence of the presence of this substance. It was unfortunate that you thought the "small sediment" unworthy of notice.

C. J. M.—There is nothing wrong about your analysis but the result—a serious defect. It will repay you to experiment on sugar containing a trace of morphia, and thus learn the precautions required in such investigations.

PETROLIA.

THE American oil region, whose metropolis bears the fancy title of our sketch, is situated in the north-western corner of the State of Pennsylvania, adjoining the boundary of the State of New York, and near the shores of one of the great interior seas of America—Lake Erie.

Thirty years ago these uncultivated wilds, which abounded in game, were frequented only by hunters and a few remaining aborigines, semi-civilised relics of the "Senecas," and yet those immense woods of giant pines bordered an old and fertile region of western New York and Pennsylvania. At that period no one imagined the future wealth which would be one day revealed there. The Indians were in the habit of burning a kind of oil-saturated earth, resembling peat, to accomplish their rude cooking, and they also gathered here and there black looking and odoriferous mineral oil, used in rheumatism, &c., and known in every drug store as "Seneca Oil."

French Creek was the neighbourhood where this oil was procured. Mineralogists had often predicted that rich deposits lay beneath the surface, but their most enthusiastic imaginings or calculations never reached an iota of the actual results afterwards. The transformation of the aspect of this district has been complete; with the exception of the woods, mountains, and streams, all has changed.

Towns, villages, and even cities, populated by a busy race of speculators, have arisen on the wildest sites, and the market value of the land has augmented in fabulous proportions. Formerly 3*l.* per acre was the price for land, but now certain chosen spots are valued at 16,000*l.* the acre. There are nearly eighteen hundred companies with a capital of two hundred million pounds now in actual operation in the oil district. The American Eldorado is therefore no longer California but Petrolia, and rock oil, not gold, reigns. The product from 1859 to 1869 was nearly twenty-eight million barrels, and in the last five years nearly six times that quantity has been procured. In the year 1864, when the frenzy was at its height, the writer of this article made a brief trip to the oil regions, and a popular account of the jaunt, in which as much as possible the *couleur locale* will be preserved, is adjoined.

Reliable reports from resident friends out there told of sudden fortunes tumbling into unexpected laps, and the quoted figures of the wells removed any remaining doubt. Four thousand dollars a barrel, which, rendered intelligible to outsiders, meant that a well producing, either by flow or pumping, fifty barrels per diem, had a market value of two hundred thousand dollars—this was the crowning temptation.

So far as is known, no attempt at the extraction of utilisable oil to replace the fast diminishing supply from the whale fisheries for burning purposes had been made up to a period of twenty years since. It is only lately that the race of semi-civilised North American savages, which in old times roamed over portions of New York State and Pennsylvania, have ceased to exist, or transferred their nomadic life further west. Some of Fenimore Cooper's scenes were laid in this region, and we can never cease to wonder that such poetic aborigines found a contented existence in the midst of such an inhospitable country.

By the Erie Railway from the city of New York there is a distance of nearly six hundred miles to be traversed before reaching the oil country. In a rough, but appropriate, costume for the trip, I quitted the metropolis one December afternoon, and crossing the "noble Hudson," took the train at the Erie landing in Jersey, which soon whirled us away from the surrounding settlement, Pavonia, and through the Bergen tunnel, traversing which rocky bore we enter upon the tedious trip west. Turner's is the first halt, and there the oyster stews, cold apple pies, and colder coffee, with other specialities of the American *cuisine*, are devoured by our passengers with an energy denoting a lengthened fast. Further progress takes us through the Delaware Gap lumber country, over the magnificent Starrucca Viaduct—round mountain sides, through tunnels and cuttings, in fact we traverse as wild a country as can be found on the great Pacific line to San Francisco, and all this in the old State of New York, the most populous and thickly settled of the Union. Those thriving towns—yclept cities—Elmira and Corning, are stopped at to water the iron horse and permit the passengers to consume further oyster stews, pumpkin pies, &c., and in the afternoon of the day following our departure, we reach the old country town of Franklin, Pa.

Here, worn out with the rail travel, a new and most disagreeable episode of the trip is entered upon. Several miles have to be traversed in ricketty old waggons, through a perfect sea of mud, to reach the boat, which is rocking upon the billowy Alleghany. Already we scented in the breeze the peculiar odour which came through the gorges; it was nectar to the expectant crowd of fortune-hunters.

Our more or less civilised group of passengers on the rail had by this time resolved itself into an exclusive oil party, *en route* for the newest Eldorado. Such a motley collection of grotesque individuals one would find only in the mining districts of Nevada or Sacramento. For two hours we threaded the serpent-like sinuosities of this narrow stream, passing through as wild and broken-up country as could be imagined; this we discovered afterwards, for the pitchy darkness rendered the peculiarities of surrounding nature invisible. Our pilot evidently went on the principle of feeling his way, as every few minutes our boat scraped the bottom, fortunately for us not of a dangerous character. Whoever has not heard the wild screech of these high-pressure western steamers would become not a little nervous at the sounds on board. The bow was ornamented with a demon-like figure-head, being nothing less than a large iron basket, supported on an iron bowsprit, and filled with flaming coals. This original method of signal lighting served also to cast a bright gleam upon the water ahead, and aided the pilot somewhat in guessing his way along. The boilers and furnaces were in the forward part of the boat, and the engines aft. Supplemented by the stern wheel, this arrangement kept the craft in a proper balance, and the long connecting shaft was admirably disposed on the floor of the main saloon for everybody to stumble over.

Hardly were we under weigh and gathered around the red-hot stove in the saloon, listening to the wonderful tales of sudden riches accumulated in this region, than a robust and backwoods-like-looking dozen of men installed in the centre of the saloon a table covered with the time-honoured oilcloth, and mildly suggested a little game, "not for the purpose of winning your money, gentlemen, but merely to while away the time." Having read about this sort of thing, we "Yorkers" held off, whereupon some of their own crowd ventured a few modest wagers; but the thing turned out a failure: the aspect of these hardy miners failed to inspire confidence, and after a little they bundled up their accessories, and soon after we ran ashore —wharves being still unknown in this section—upon the beach of "Oil City."

The getting off the steamer into the mud was another feat not entirely without danger, and notwithstanding the repeated assurances that there was not a bed to be had in the town "for love or money," we proceeded to the principal hotel, where the obliging landlord could only repeat to us that he had not a room or a bed left. We mildly suggested passing the night in the parlour or dining-room, on which our accommodating host threw open the door of the saloon, and informed us that if we "could make ourselves comfortable there we were welcome." Radiating from a common centre, consisting of boots on the floor, snored four-and-twenty stalwart speculators, with their blankets twined around them and their old coats as pillows. Not an available inch of space being visible, we returned in a dejected mood to the bar-room and resigned ourselves to pass the remainder of the night in the arm-chairs, picturesquely grouped around another red-hot stove. Hungry as well as tired, we asked for a lunch, but once again we were met by a conclusive reply, "The boys have all gone to bed, and there isn't a thing left in the house to eat, but we shall give you an early breakfast." Gradually we went off into slumbers more or less fitful, and this dreadful night was got through. Day had hardly broke, when our refuge was invaded by a swarm of hungry and dirty travellers, and further sleep was impossible. We made a rush for the only washbasin, the lump of yellow soap, and the unique towel. The public tooth brush was clean compared with that towel in half an hour; fortunately, we got in early in the game. As for the breakfast, we need only add that ten active years have not sufficed to erase it from our memory. With all its faults, whiskey was the safest diet presented at that breakfast-table. Tea and coffee were there as a matter of form, but on that occasion it was not altogether a sign of depraved taste if they were neglected for the more "seductive fluid." No *cordon bleu* had ever visited these wilds, and ostriches were the only living things capable of digesting the cooking in this region, it seemed to me.

Every city, town and village in America rejoices in its "Main Street," and our petroleum metropolis was traversed by an unfathomable waste of mud bearing this appellation. Guiltless of side-walks, here it was that the utility of our large boots was demonstrated. A walk from one end of the settlement to the other was a feat; that constant procession of teams laden with barrels of oil and dragged by fagged and struggling horses through a sea of mud, and under an almost incessant drizzle, produced a by no means cheering effect. The teamster who waded beside the horses earned his pound a day or he would not work. For a mile along the river on the beach and up the creek on which the principal wells were situated lay thousands of barrels of crude oil waiting transport to the great markets. This extempore town already numbered several hundred houses, if such briefly constructed edifices could be so distinguished, and the work of adding to these was going forward night and day. A bank and a newspaper were already in full operation. Up the creek a most originally picturesque sight presented itself—hundreds of derricks covered the flat land between the creek and the bluff, indicating producing wells or borings for new ones. These were pumping wells; to reach the celebrated flowing ones it was necessary to go on horseback up the creek several miles, traversing the stream many times at indicated fords, and at short intervals encountering small settlements hastily established in proximity to some productive wells. These frequently bore uncouth titles, sometimes the name of the proprietor of the land.

The sudden wealth acquired by the farmers turned the heads of some of them, or their families, and they came down to New York and began a grand existence, which generally lasted only a year or two. Many of the wells cease to be productive after a year, some in a few weeks, and constant boring in ever-changing localities, but in the immediate vicinity, has to be resorted to. The business has now settled down into a legitimate affair, and the long and steady efforts of skilled labour and capital are requisite for its prosecution.

THE ADULTERATION OF BEER.

THE detection of bitter substances used to adulterate beer is so full of difficulty that we are not surprised to find that the details of the labours of Dr. Dragendorff, Professor at the University of Dorpat, have been published in German, and have also very quickly found an able translator into the French language in the person of Dr. Jul. Morel, of Ghent. The original German paper appeared in the fourth division of the *Archiv der Pharmacie* for 1874. Dr. Morel's translation is in the form of a pamphlet.

Dr. Dragendorff had already made extensive investigations as to the methods of separating the alkaloids, and it was with the view of utilising the processes he had devised to the detection of bitter substances used to adulterate beer that he undertook the experiments described in his voluminous paper, assisted by Drs. Kubicki and Jundsill.

Dr. Dragendorff divided his experiments into two categories. The first was made with the view of ascertaining whether there exist in malt, or in the fermented extract of malt, any matters which are extracted from the aqueous solution by the means employed to isolate the adulterant, and possessing such qualities as to interfere with the satisfactory examination of the latter. Further, to what extent would the author's processes serve to isolate the bitter substances employed to adulterate beer. Under the second category the author made experiments with the view of ascertaining whether the sources of error discovered by the first experiments could be eliminated by a special treatment without interfering with the detection of the foreign substances. In this Dr. Dragendorff claims to have succeeded, and also in demonstrating the possibility of discovering the small proportions of bitter principles which suffice to impart their flavour to beer.

In order to provide for the desirability of giving a table for the exhaustive examination of beer, the author included in his experiments nearly all the bitter drugs which it has been assumed possible to employ for the adulteration of beer. These substances may be enumerated as follows: Quassia, wild rosemary, absinth, bog-bean or marsh trefoil, safflower, centaury, gentian, willow-bark, aloes, picric acid, colocynth, cocculus indicus, colchicum seeds, mezereon, capsicum, belladonna, henbane, and nux vomica. The author is convinced that opium is not used in brewing. Although some of the drugs mentioned above are perhaps never used for the purpose of adulteration, it is nevertheless necessary to embody them in the scheme in order to enable the analyst to prove their absence in case he should be so required by capticus people. In respect also to substances which are comparatively harmless, such as absinth, it must be held that they are adulterants, as the consumer in purchasing beer does so on the supposition that malt and hops alone are used in its preparation. Dr. Dragendorff suggests also the usefulness of a process for detecting cetratric acid, if such a process could be discovered, in order to establish the presence or absence of Iceland moss, which is used for thickening beer.

The experiments are divided under four heads:—

I. Concerning the methods employed, and the nanner in which the trial liquids were prepared.

First method. From 600 to 1,000 c.c. of the beer are evaporated on a water bath to a syrupy consistence; the residue is then introduced into a flask and left in contact for 24 hours with three or four times its bulk of alcohol at the ordinary temperature. The liquid is then filtered, the alcohol distilled off, and the residue set aside for 12 or 20 hours, and then again filtered. Several drops of dilute sulphuric acid are added to the filtrate, which is then agitated with rectified petroleum spirit. The spirit is decanted, washed, filtered and evaporated at the ordinary temperature. Some hop substitutes may be recognised by the smell, which would not be possible if the residue were heated. If there is an appreciable solid residue after evaporation of the petroleum spirit, the aqueous fluid should be exhausted by repeated agitations with the spirit. This operation is followed by similarly agitating the aqueous fluid with benzine and chloroform, and after submitting the residue to a fresh treatment with petroleum spirit the aqueous liquid is made alkaline with ammonia and agitated with benzine. Finally, in order to isolate salicine a treatment with amylic alcohol is necessary.

Second method. From 600 to 1,000 c.c. of the beer are heated in order to eliminate the greater part of the carbonic anhydride; the liquid is then allowed to cool, and basic acetate of lead is added so long as a precipitate continues to be formed. After standing some time the fluid is filtered. To the filtrate is added sufficient dilute sulphuric acid to precipitate the excess of lead, and the liquid is again filtered. The precipitate should not be washed in either case with a great quantity of distilled water. If the filtrate from the sulphate of lead, before concentration, has a bitter or sharp taste, it is a sign of adulteration. The sulphuric acid is then nearly neutralised with ammonia, and the fluid evaporated on the water bath as rapidly as possible until it is reduced to 180 or 200 c.c. The residue is then allowed to cool, and then agitated with petroleum spirit, benzine and chloroform.

Since normal beer contains principles which are dissolved by the three liquids used, a description follows of the manner in which trial fluids were prepared, so as to establish the differences between malt extract, extract of hops or other bitter substances, extract of hopped malt, extract of malt fermented in the ordinary manner, extract of malt fermented at low temperatures, extract of hopped malt fermented by each method, adulterated beer and mixtures of beer.

II. Concerning the characters of the normal constituents of beer separated by the processes indicated.

The experiments made under this head showed that normal beer should give the following results when submitted to the first method of analysis.

In the residue obtained from the petroleum solution:—

1st.—An amorphous substance, of feebly bitter taste, soluble in alcohol and ether, but partially soluble in water.

2nd.—A substance derived from the hops and precipitable by basic acetate of lead.

3rd.—A substance derived from the hops, which gives a red colour with Fröhdé's reagent.*

---

* One cubic centimetre of concentrated sulphuric acid to one centigramme of molybdate of sodium.

4th.—A substance derived from the malt, which, by the action of sulphuric acid and sugar, or bile, affords a red colour.

In the residue from the benzine solution the same substances are found, but in larger quantity. We find besides :—

5th.—A substance which by ebullition with concentrated hydrochloric acid turns brownish black.

6th.—A substance precipitable by tannin. The residue from the chloroform solution contains also the substances marked 1, 2, 5, and 6, and besides—

7th.—A substance precipitable by iodised iodide of potassium and phospho-molybdic acid.

8th.—A substance which by heat reduces the ammoniacal solution of silver.

In the benzine solution, after the addition of ammonia, are found larger quantities of the substances marked 4 and 7, and besides—

9th.—A substance crystallisable from ether and difficultly soluble in alcohol.

Under the second method of analysis the following results were obtained :—

There was hardly any residue from the petroleum solution.

A very slight residue from the benzine solution, incapable of reducing chloride of gold, even when heated.

The residue from the chloroform solution was likewise insignificant.

Dr. Dragendorff therefore concludes that it is advisable to use the second process in all cases where the bitter principle to be determined is not precipitable by basic acetate of lead.

III. Concerning the characters presented by the bitter substances enumerated.

1. *Quassia.*—Examined under the first method this drug yielded the following results :—

To Petroleum.—A small quantity of amorphous, colourless, bitter residue.

To Benzine.—A yellowish, amorphous, very bitter residue, almost completely soluble in absolute alcohol, very slightly soluble in anhydrous ether, and only partially soluble in water. The aqueous solution was abundantly precipitated by tanning.

To Chloroform.—A substance similar to that extracted by benzine, although the use of the latter had been continued until it would dissolve no more.

Benzine dissolved nothing appreciable after the liquid had been made ammoniacal.

Under the second process benzine extracted a small quantity of a colourless substance, but insupportably bitter. It appears that 0 04 per cent. of quassia may be detected as above.

2. *Wild Rosemary.*—Under the second method of analysis this plant yielded to benzine, and more particularly to chloroform, a pale yellow resinous residue, having a marked bitter taste, but uncrystallisable. Heated with chloride of gold, reduction takes place, attended with an odour of oil of ericine, which may also be very well developed by boiling the residue with dilute sulphuric acid. With sulphuric acid and sugar the residue gradually acquires a beautiful red colour.

3. *Absinth.*—Under the first method the benzine residue is amorphous, greenish, and possesses the peculiar bitter taste of absinth. It is entirely soluble in alcohol and ether and partly so in water. Precipitable by tannin, but not by acetate of lead. Concentrated sulphuric acid and Fröhdé's reagent determine the characteristic reaction of absinthine, namely, the production of a brownish colour, which passes into violet and blue. Under the second method of analysis a similar result is obtainable.

4. *Bog-bean or Marsh-trefoil.*—Under the first process chloroform dissolves most largely a greenish amorphous substance, insoluble in ether and partially soluble in boiling water; precipitable by tannin and capable of reducing ammoniacal solution of silver. The characteristic odour of the volatile oil was best developed by heating with dilute sulphuric acid. Under the second process similar results were obtained with the residue from the benzine and chloroform solutions.

5. *Safflower.*—Under the first process benzine extracted a greenish amorphous bitter substance, partly soluble in anhydrous ether and water, and completely soluble in alcohol. The part insoluble in ether was coloured green by cold concentrated hydrochloric acid, brown by hot acid. Concentrated sulphuric acid and Fröhdé's reagent afford a red colour, which becomes brownish.

6. *Centaury.*—Under both methods of treatment chloroform dissolved most abundantly an amorphous, green, and very bitter substance, precipitable by tannin, and coloured green by hydrochloric acid. A characteristic odour was developed by heating with dilute sulphuric acid.

7. *Gentian.*—Beer containing the soluble part of 1 per cent. of its weight of gentian gives, by the first process and treatment with chloroform, a residue of bitter taste, precipitable by tannin, and coloured brown when heated with ferric chloride.

8. *Willow Bark.*—By treatment under the first process and amylic alcohol, impure salicine may be isolated.

9. *Aloes.*—The first method of treatment enables benzine to extract a crystalline, yellowish substance, slightly bitter, soluble in caustic potash, like chrysophanic acid, with production of a fine reddish-purple colour. This residue, treated with fuming nitric acid, furnished a substance analogous to chrysammic acid.

10. *Picric Acid.*—Under the second process the following points indicate the presence of picric acid :—*a.* The yellow colour of the filtrate from the sulphate of lead. *b.* The bitter taste of the filtrate. *c.* The yellow colour of the residue from petroleum spirit, its crystalline character, solubility in water and capability of dyeing wool.

11. *Colocynth.*—By the first process and treatment with benzine colocynthine may be separated.

12. *Cocculus Indicus.*—Picrotoxin may be isolated by treatment with chloroform, after subjecting the beer to the second method of treatment, and in a sufficient state of purity to afford the characteristic crystals by spontaneous evaporation of its alcoholic solution, as well as Langley's reaction, if it be purified by repeated solution in water and extraction by chloroform.

13. *Colchicum Seeds.*—By treating the beer under the second method, extracting with chloroform and evaporating, a residue may be obtained which contains colchicine, but will not give the reactions of this body in a satisfactory manner unless repeated solution in water and extraction by chloroform is adopted as a means of purification.

14. *Mezereon.*—By treatment under the first process benzine and chloroform will extract a greenish, crystallisable, bitter substance, insoluble in anhydrous ether. When applied to the tongue it produces inflammation and a kind of insensibility.

15. *Capsicum.*—The first method and amylic alcohol are best adapted for the extraction of capsicine, or treatment of the alkaline solution with petroleum spirit.

16–18. The active principles of belladonna, henbane, and nux vomica may be isolated if the aqueous fluid is made alkaline and treated with benzine.

A Scheme for the Determination of the Presence of Foreign Bitter Substances in Beer.

This scheme is prepared on the supposition that the beer is analysed in accordance with the second method, using at least a quart of beer, and dividing the several solutions for spontaneous evaporation in about six watch glasses.

AGITATION WITH THE ACID SOLUTION.

Residue from Petroleum Spirit.

a. Amorphous, coloured by sulphuric acid, first brown, then violet, last reddish-violet—absinthine. *b.* Amorphous, colourless, of sharp taste and inflaming the skin; sulphuric acid affords a reddish-brown colour—indicates capsicine. *c.* Amorphous, greenish; coloured red by sulphuric acid and sugar, does not precipitate ammoniacal silver—indicates the resin of juniper berries. *d.* Crystalline, yellowish; becomes red when treated with cyanide of potassium—indicates picric acid.

Residue from Benzine.

a. Crystalline: It is not bitter; potash colours it reddish-purple; sulphuric acid colours it first red, then orange—aloes. *b.* Amorphous; an aqueous solution precipitates chloride of gold, but does not reduce it.

α. Aqueous solution not precipitated by tannin; the residue has a sharp taste—capsicine or mezereon.

β. Aqueous solution, bitter; precipitable by tannin.

I. Clouded by basic lead acetate; sugar and sulphuric acid give a faint red colour.

1. Aqueous solution, heated with ferric chloride, becomes brownish-green; very slightly bitter—gentian.

2. Aqueous solution, coloured brown by ferric chloride; characteristic bitter taste—quassia.

II. Basic lead acetate affords abundant precipitate; sugar and sulphuric acid colour it cherry red—safflower.

a. Aqueous solution does not affect chloride of gold in the cold, but reduces it when heated.

a. Aqueous solution clouded by tannin, does not reduce ammoniacal silver—rosemary.

β. Aqueous solution precipitable by tannin; reduces ammoniacal silver—marsh trefoil.

b. The aqueous solution precipitates the chloride of gold, but does not reduce it even when heated—centaury.

c. Aqueous solution precipitates chloride of gold and reduces it when heated. Dissolved in sulphuric acid affords brown and then violet colour. Hydrochloric acid, sp. gr. 1,135, turns it green, then blue—absinth.

Residue from Chloroform.

A. Neither precipitates nor reduces chloride of gold.

a. Sharp taste; not precipitated by tannin; coloured reddish brown by sulphuric acid; inflames the skin—capsicine.

b. Precipitable by tannin.

a. Precipitated by basic acetate of lead. Heated with dilute sulphuric acid disengages a slight odour of benzoic acid—safflower.

β. Not precipitated by basic acetate of lead.

I. Sulphuric acid colours it brown.

1. Bitter residue—quassia or gentian.
2. Sharp taste—mezereon.

II. Sulphuric acid does not colour it brown—colocynth.

B. Does not precipitate chloride of gold, but reduces it when heated.

a. Not precipitable by tannin—picrotoxin or aloes.

b. Precipitable by tannin—rosemary or marsh trefoil.

C. It precipitates chloride of gold, but does not reduce it when heated; nitric acid colours it violet—colchicine.

D. Precipitates gold and reduces it when heated; sulphuric acid colours it brown and then dirty violet—absinth.

AGITATION WITH THE AMMONIACAL SOLUTION.

Under this head are found atropine, hyoscyamine, strychnine, and brucine when agitated with benzine. Salicine is isolated by agitation with amylic alcohol.

MONOBROMATED CAMPHOR.

M. GAULT, a pharmacien at Nancy, has summarised in an interesting note the researches made by different chemists on monobromated camphor, and has examined into the conditions which are most favourable to its preparation. This compound being now employed by many physicians, we think it will be interesting to pharmacists to know its principal characters, and how it may be prepared.

Monobromated camphor was discovered by M. Schwartz in 1862, and studied successively by Messrs. Perkin, Maisch, and Gault.

It is known that camphor and bromine combine by simple addition, and that the product $C_{10}H_{16}OBr_2$ is very unstable. Perkin observed that by distilling this body, and purifying the distillate obtained above 264° C., monobromated camphor is obtained:—

$$\underset{\text{Camphor bromide.}}{C_{10}H_{16}OBr_2} = \underset{\text{Monobromated camphor.}}{C_{10}H_{15}OBr} + \underset{\text{Hydrobromic acid.}}{HBr.}$$

Monobromated camphor is therefore camphor in which one atom of hydrogen is replaced by one atom of bromine. It can be prepared by heating at 100° C. for some hours, in sealed tubes, one molecule of camphor and one molecule of bromine, and purifying the product; but this method occasions great loss.

M. Maisch has proposed to prepare monobromated camphor by forming first the camphor dibromide at a low temperature and in presence of alcohol, then decomposing this at 132° C., and finally transforming the major part of the oily residue into monobromated camphor at 260° C. According to M. Gault, the use of alcohol is not necessary. This chemist, profiting by the observations of Perkin and of Maisch, recommends the following process, which is described in his own words:*—

I introduce a given quantity of camphor into a flask capable of holding ten times the volume of dibromide to be prepared; I then cause to fall on this powder, agitating the while, a fine stream of bromine, until the camphor is liquefied. Under these conditions about one molecule of bromine is used for one molecule of camphor.

The transformation of the camphor dibromide into monobromated camphor is effected in the same flask, to which is now adapted a large and long tube leading into an alkaline solution, for the absorption of injurious vapours. The flask is placed in water, which is raised to the boiling point; the reaction immediately commences, accompanied by the abundant disengagement of hydrobromic acid and some vapours of bromine and undecomposed camphor. The liquid, at first of a rich brown, acquires an amber colour, and the disengagement of gas suddenly slackens. The arrangement of the apparatus and the tumultuous disengagement of gas have not permitted a determination of the exact temperature of the reaction, but it is certainly between 80° and 90°, and does not reach 132°. This temperature, indicated by M. Maisch, is too high; I insist on this last point, because I have been able to convince myself, by a comparison of processes, that the quantity of oily product is thus notably diminished, and that the purification of the monobromated camphor becomes much more easy. The amber liquid in the flask solidifies on cooling into a friable mass, of a pale lemon colour. If the contents of the flask be emptied into a capsule it will be noticed that the disengagement of hydrobromic acid still continues and does not cease for some hours. But if this same liquid be thrown into boiling distilled water, and the boiling kept up for some time in the open air, the hydrobromic acid and the last traces of bromine are almost entirely removed, and what remains is nearly white. I should remark that the volatilisation of monobromated camphor by means of water vapour, a fact announced by M. Maisch, is not so notable as to neutralise the advantages of this first step in purification. To obtain a colourless and crystalline product, either the method of decolorisation by animal charcoal, or that of successive crystallisations may be adopted. In either case the crude lemon-coloured mass is treated by boiling alcohol (90°–95°), and the filtered liquid left to crystallise. The crystals obtained are dried in the open air on unsized paper. The plan of successive crystallisations presents a certain advantage over that of decolorisation; indeed, the mother liquors are coloured by concentration and require a new addition of charcoal each time.

Monobromated camphor forms tufts of colourless acicular crystals, with a rectangular base, sometimes three centimetres long. These crystals are hard, and crack between the teeth; their odour is at the same time camphoraceous and terebinthinate, less penetrating than that of camphor, but also less fleeting. The taste, slightly bitter, recalls that of camphor and Venice turpentine.

Monobromated camphor is insoluble in water, soluble in alcohol, fixed and volatile oils, ether, sulphide of carbon, chloroform, &c. It melts at 67° according to Maisch, and at 70°–76° according to other observers. Heated to 100° it gives no sublimate of camphor; ignited with potash it leaves a residue of carbonate and bromide.

In the mother liquors, and in the crystals of the second and third crystallisations, is an oily substance, the hydrobromate of monobromated camphor, the utilisation of which constitutes the fourth phase in the above process. This body may be almost entirely removed by submitting the crystals to pressure between folds of filtering paper, but this operation causes considerable loss. I have also tried the use of alkalies, in the hope of fixing the hydrobromic acid, but the result was not successful. It is preferable to follow the indications furnished by M. Schwartz, according to which the dissociation is effected at 260°, as represented by the equation—

$$C_{10}H_{15}OBr\,HBr = C_{10}H_{15}OBr + HBr.$$

I ought to observe, however, that in order to avoid carbonisation of a large proportion of the product, it is preferable to work below 260°, for between 200° and 220° the disengagement of hydrobromic acid is abundant and almost complete. The product is a black viscous mass, which, on cooling, becomes solid and brittle. With boiling alcohol, the mass furnishes, after filtration, new colourless crystals of monobromated camphor. If the anti-spasmodic and sedative properties of this body are confirmed, physicians may easily obtain it in a state of great purity, for by the above process pharmaceutists will be able to prepare it in their own laboratories.

---

* *Journ. de Pharm. et de Chemie*, December, 1874, p. 438.

Abstracts of Foreign Papers.

ACONITINE BY DIFFERENT PROCESSES.*

As is well known, the method of obtaining aconitine differs with the authority to which reference is made. Aconitine by Hottot, of Paris, is far more active than that of German and English manufacturers, and it has hitherto been sought to explain the reason of this peculiarity partly by the habitat and country of *A. Napellus*, and partly by the process adopted for the preparation of the alkaloid. There is little doubt that the true reason lies in the water retained by the aconitine. Aconitine is an amorphous substance, which, when dried on the waterbath, retains no water, but can easily enclose over 20 per cent. without being damp. In a body so active as aconitine the difference caused by water so held must of necessity be very great. According to this only an aconitine dried on the *waterbath* should be official, seeing that the water retained will always vary with the degree of dry heat employed. The maximum dose of dry aconitine might then be reduced to ·003.

ON THE CHEMICAL NATURE OF DIGITALINE.

The nature of digitaline has recently been elucidated by the researches of M. C. Kosmann.† Purple digitalis contains a proximate principle known under the names *digitaline*, *digitasoline*, *digitalétine*, soluble in water, very hygroscopic, and readily altered by the action of water, of acids, and of alkalies. Diluted sulphuric or hydrochloric acids bring about its decomposition into glucose and *insoluble* digitaline; if the action be continued this latter body breaks up into glucose and *digitalirétine* (also called *paradigitalétine*); by further prolonged action of the acids, digitalirétine yields the dehydrated body of the same name and four molecules of water. The ease with which digitaline breaks up accounts for the fact that both the soluble and insoluble kinds are always obtained from the plant. As will be seen from what has been stated above, both these bodies are glucosides. The first is a combination of digitalirétine with two molecules, and the second of the same body with one molecule of sugar. German digitaline consists chiefly of the soluble kind, whilst the insoluble modification forms the greater part of that made in France, the difference depending on the mode of preparation. The German process gives 0·790 per cent. of digitaline from the dried plant: of this 0·693 per cent. is soluble in water. The formula of soluble digitaline is $C_{54}H_{84}O_{27},3H_2O$; that of insoluble digitaline (digitalétine) is derived by removal of glucose—

$$C_{54}H_{84}O_{27},3H_2O - C_{12}H_{24}O_{12} = C_{42}H_{66}O_{18}.$$

The formulæ of digitalirétine and dehydrated digitalirétine may be similarly derived:—

$$C_{42}H_{66}O_{18},4H_2O - C_{12}H_{24}O_{12} = \underset{\text{Digitalirétine.}}{C_{30}H_{50}O_{10}.}$$

$$C_{30}H_{50}O_{10} - 4H_2O = \underset{\text{Dehydrated digitalirétine.}}{C_{30}H_{42}O_6.}$$

This last-named body approaches the true resins in the large proportion of carbon which it contains; it fuses at 60° C., has an acrid taste, is insoluble in water, soluble in alcohol, ether, and in ammonia. Digitalirétine fuses at 165° C., is insoluble in water, ammonia and caustic soda, slightly soluble in ether, soluble in hot alcohol, and has a slightly bitter taste: it occurs in sparkling crystalline grains or in nacreous spangles.

If soluble digitaline be compared with salicine, many points of correspondence will be observed. A molecule of soluble salicine yields the much less soluble *saligénine* by loss of two molecules of glucose, and this, by loss of two molecules of water, becomes the insoluble body *salirétine*. Further, salicine combines with bases, and the author has obtained a compound of digitaline with soda—a digitalinate of sodium perfectly crystalline in radial masses.

ESTIMATION OF CHLORINE IN PRESENCE OF SULPHUROUS ACID.

M. G. Tunge ‡ first destroys the sulphurous acid by addition of potassium permanganate till a faint rose tint is produced. Carbonate of sodium is then added carefully till the liquid is neutral, and titration is effected with solution of silver nitrate, after addition of a drop of yellow chromate solution.

GREEN IODIDE OF MERCURY.

This is prepared by M. Lefort by adding to an aqueous solution of 60 grains of sodium pyrophosphate in 300 c.c. of warm water 30 grains of mercurous acetate, and a solution of 30 grains of potassium iodide in 1 litre of water. The product is of a constant yellowish-green colour, and is free from mercuric iodide and metallic mercury.

KOUSSINE.

Crystallised koussine is described by Messrs. Flückiger & Buri in *Archiv. de Pharm.*, September, 1874, p. 193, as occurring in needles several millimetres long or in short prisms, belonging to the right prismatic system. Concentrated sulphuric acid, saturated with koussine below 15° Centigrade, deposits either rhombs or radially grouped needles at a still lower temperature. The density of these crystals is remarkable; they sink in sulphuric acid 1·842. They are yellow in colour, but the fine powder is white. Koussine contains no water, and fuses unchanged at 142° Centigrade; it is not volatile, and above this temperature it exhales the odour of butyric acid. It is not soluble in boiling water, but readily dissolves in ether, benzine, chloroform, bisulphide of carbon, and slightly so in acetic acid, and in alcohol. A chloroform solution of koussine has no action on polarised light. Koussine forms a yellow solution with caustic or carbonated alkalies; this solution becomes red in time, or immediately if heated. Fused with caustic potash, koussine decomposes into butyric, formic, and oxalic acid. Ultimate analysis gave numbers agreeing with the formula $C_{32}H_{38}O_{20}$.

IODIC ACID AND IODATES.

Iodic acid and iodates are prepared by M. E. Reichardt* by adding chlorinated lime to the liquor obtained by saturating a soda or potash solution with iodine. By this means the alkaline iodide is converted into iodate, and the conversion is complete when a few drops of hydrochloric acid fail to liberate iodine. Iodate of calcium crystallises out from the solution. Iodic acid is obtained from this by the addition of an equivalent of sulphuric acid.

TEST FOR NARCEÏNE.

According to A. Vogel, on adding chlorine water to narceïne, and then a little alkali, a deep blood-red colour is produced, which is not destroyed by heat or by excess of alkali.

ACTION OF TURPENTINE AND ACETIC ACID ON LEAD AND ZINC

J. M. Merrick finds that both lead and zinc are considerably acted on by oil of turpentine, whilst tin is scarcely affected. The action of glacial acid on tin is about 5,000 times as great as when the same acid is mixed with an equal bulk of water.

NEW METHODS OF PRESERVING ERGOT OF RYE.

Mr. Amici Lingi proposes to macerate the ergot for several hours in the following solution:—

Distilled Water	95 parts.
Alcohol	5 ,,
Chloral Hydrate	10 ,,

Afterwards spread the ergot out on the blotting paper, and dry in the shade. If decomposition has already commenced a somewhat longer immersion will suffice to arrest it.

An apparently better method is recommended by M. Ducros in the *Journal de Chimie Médicale*. The author says he has proved its excellence by an experience of forty years. It consists simply in keeping the ergot in a well-stoppered bottle, in a dry place, and always covered with finely powdered wood charcoal. The charcoal of oak or pine is the most suitable.

---

* *Pharmaceutische Zeitung.*
† *Journ. de Pharm. et de Chemie*, December, 1874, p. 427.
‡ *Journ. de Pharm. d'Anvers*, October, 1874, p. 452.

* *Journ. de Pharm. et de Chem.*, from *Archiv. de Pharm.*, August, 1874, p. 109.

CHEMISTRY OF THE TAR ANTISEPTICS.

A Lecture delivered to the Liverpool Chemists' Association on December 17, 1874, by Mr. W. E. Bickerdike, F.C.S.

THE subject which I propose to bring before you this evening is rather imperfectly described in the title of my Paper.

The tar antiseptics possess a very high degree, perhaps their highest degree, of importance and interest in respect to those properties which render them so serviceable in a sanitary point, not only for the general purposes of disinfection, for which they are extensively employed, but also for their application in the antiseptic treatment of surgical cases, which may be said to owe its origin to the employment of these bodies. An account of the tar antiseptics would be very imperfect if these characteristics were not included, and I propose to refer briefly to them to-night, although they scarcely belong to the chemistry of the subject.

Gas tar, as you are aware, is a highly complex mixture; it consists of a great number of liquid and solid bodies, some of which have been but imperfectly studied. It is probable that several of the constituents of tar possess more or less the characters of antiseptics, but this property is especially characteristic of the alcohols, phenol and the isomeric cresols, commonly known as carbolic and cresylic acids; possibly higher homologues of these compounds may exist, having similar properties. At the present time, however, these two bodies (which are really alcohols, and not acids) are by far the most important antiseptics contained in tar, and there can be no doubt that the ancient reputation of tar as an antiseptic was largely owing to their presence.

By the term "Tar Antiseptics," then, I refer especially to carbolic and cresylic acids, or, more correctly, phenol and cresol, these being the only bodies which are separated from coal tar on a commercial scale, with a view to their employment as antiseptics. In tracing the history of these products, it is necessary to refer briefly to the treatment of tar by which its constituents are separated from each other. The first process consists in simple distillation, by which the volatile portion is removed from the non-volatile. In this process of course the bodies with lowest boiling points first pass off, and as the temperature rises the higher products are driven over; when the volume is reduced to one-half, the tar has lost all its volatile constituents, and the residue is incapable of yielding further products, except by destructive distillation.

In the annexed table a list is given of the constituents of coal tar, together with the boiling point of each compound. The list will no doubt become greatly extended by further research.

Constituents of Gas Tar.

Name	Boiling Point Centigrade Deg.	Name	Boiling Point Centigrade Deg.
Hydrosulphuric acid ..	—	Anilin	182
Ammonia..	—	Phenol	184
Benzene	81	Parvoline	188
Water	100	Paracresol	200
Toluene	111	Naphthalene	212
Pyridene	115	Rubidine	230
Pyrrol	133	Leucoline	235
Picoline	135	Viridine	251
Xylene	139	Cryptidine	256
Cumene	148	Anthracene	350
Lutidine	154	Pyrene	—
Collidine	170	Chrysene	—
Cymene	171	Pitch	—

On the first distillation of the tar, these products are, as you might expect, very much mixed together; in fact, we may compare the result to a spectrum in which the colours overlap one another, and in this second diagram I have represented both the order in which the results present themselves, and approximately the degree in which they are intermingled:—

Light oil.
Naphthalene,
Cumene, Phenol, Leucoline,
Pyrrol, Cymene, Rubidine, Cryptidine,
Toluene, Pyridine, Anilin, Naphthalene, Anthracene,
Benzene, Xylene, Cumene, Phenol, Cresol, Naphthalene, Chrysene,
Water, Toluene, Lutidine, Anilin, Leucoline, Pyrene,
Naphthalene, Cymene, Phenol, Viridine
Collidine, Cresol,
Naphthalene.

The left-hand member (Benzene) represents the commencement of the distillation. and the right-hand member (Chrysene) the termination. By drawing a vertical line through the diagram at any point it will pass through the names of those substances which distil together. Naphthalene appears at almost every stage of the process, notwithstanding its boiling point is 212° C.

In the practical working of the operation this distillate is not all run into one receiving vessel, but is collected in three separate portions. The first receiver is used as long as the liquid coming from the still is lighter than water; when the sp. gr. reaches 1,000 to 1,010 the contents of the first receiver are set aside as "light oil." The distillation is then continued in the second receiver until the oil begins to contain anthracene, when the receptacle is again changed, and the remainder of the distillate collected in the third vessel.

These three portions are afterwards treated by special methods, in order to separate any particular constituent that may be required. Anthracene is separated from the last portion. The middle portion, called creosote in England and pitch oil in Scotland, contains a large portion of cresol, and is employed without further treatment for saturating railway sleepers, in order to protect them from decay. From the first the benzene, toluene, phenol, and cresol are separated, and it is to the last two bodies that we shall now confine our attention. In order to separate these, the light oil is agitated for some hours with a solution of caustic soda, and after being allowed to stand for some time the soda solution is removed by decantation. This solution contains both the phenol and cresol dissolved, and on neutralising the soda with acid these rise to the surface in the form of a dark-coloured oily liquid consisting of phenol and cresol, together with some sulphur compounds, water, and a quantity of pitchy matter.

The further separation of the phenol and cresol from this crude liquid is effected by repeated fractional distillation, assisted by the crystallisation of the phenol, from which the liquid cresol can be removed mechanically. When the process of purification has been carried as far as the present commercial methods will allow, we have the two bodies in the form of the samples before you. The crystallised phenol is the quality commonly used for medical purposes. It is almost, but not entirely, free from cresol, but this is not important, as the latter is quite as effective an antiseptic as the former. The cresol contains a much larger proportion of phenol, amounting often to 15 or 16 per cent. This mixture of cresol and phenol is what is commonly known in commerce as liquid carbolic acid; it is used almost solely for purposes of disinfection.

Pure phenol is generally described in text books as crystallising in long needles which fuse at 35° C. and boil at 186° C. The crystals are also stated to be very deliquescent, and but sparingly soluble in water when melted. This description is not a very accurate one, being in fact a description of an impure body. Pure phenol fuses at 112° C., and boils at 184°; it is not at all deliquescent. Water dissolves about 5 per cent. of phenol at 16° C., but at the boiling point it will dissolve an unlimited quantity. On the other hand, the melted crystals will dissolve 20 per cent. of water, and this prevents the crystallisation of the phenol at ordinary temperatures. From the fact that phenol was separated from coal tar by means of an alkaline solution, and especially from its appearing to form a compound with potassic hydrate, it was supposed to possess an acid character; on further investigation, however, it was found to possess none of the characteristics of an acid. Its aqueous solution does not redden litmus paper, and it forms no definite salts with bases.* On the other hand, in its chemical relationship it exhibits the character of an alcohol, and it may be regarded as the hydrate of the radicle phenyl (C_6H_5), just as ordinary alcohol is the hydrate of C_2H. Phenyl is thus the alcohol of benzene, the first member of the aromatic series of hydrocarbons, and the analogy between ordinary alcohol and phenol is clearly shown if we write the formulæ of the different members of the series as derived from the radicle of which the parent hydrocarbon may be considered the hydride. For instance, taking the radicle phenyl, we have—

	Phenyl Series		Ethyl Series	
Hydride	$(C_6H_5)H$	Benzene	$(C_2H_5)CO_2H$	Propionic Acid
Alcohol	$(C_6H_5)HO$	Phenol	$(C_2H_5)H$	Ethane
Ether	$(C_6H_5)_2O$	Phenylic E.	$(C_2H_5)HO$	Alcohol
Aldehyde	$(C_6H_5)COH$	Benzylic A.	$(C_2H_5)_2O$	Ether (ethylic)
Acid	$(C_6H_5)CO_2H$	Benzoic A.	$(C_2H_5)COH$	Propylic Aldehyde
Ketone	$(C_6H_5)_2CO$	Diphenyl Ketone	$(C_2H_5)_2CO$	Diethyl Ketone

---

* Calvert: *Journal of Chemical Society*, vol. 18, pp. 67 and 68.

In the one case the second member is the alcohol phenol, and in the other case ordinary alcohol. There is, therefore, *primâ facie* evidence that phenol may be an alcohol merely from the fact that its composition, as determined by analysis, enables it to supply the place of the alcohol member in the phenyl series. But in the chemistry of carbon, where cases of isomerism and metamerism are so abundant, this fact is not sufficient, and it is necessary to seek for confirmatory evidence in the chemical behaviour of the compound. This evidence is furnished by several reactions in which phenol behaves in a manner strictly analogous to ethylic alcohol under similar conditions. When, for instance, phenol is acted upon by potassium, hydrogen is given off, and is replaced by the metal $2C_6H_5OH + K_2 = 2C_6H_5OK + H_2$. In a similar manner, when alcohol is acted upon by potassium, the same interchange takes place, $2C_2H_5OH + K_2 = 2C_2H_5OK + H_2$.

Again, when phenol is heated with sulphuric acid, half the hydrogen of the acid is replaced by the radical phenyl $\left.\begin{matrix}H\\H\end{matrix}\right\}SO_4 + C_6H_5OH = \left.\begin{matrix}C_6H_5\\H\end{matrix}\right\}SO_4 + H_2O$, sulphophenic acid being produced; from this the sulphophenates or sulphocarbolates are formed by replacing the remainder of the hydrogen by the metal whose salt is required. These changes are closely paralleled by the corresponding reactions of ethylic alcohol. Ethylic alcohol, with sulphuric acid, produces $\left.\begin{matrix}C_2H_5\\H\end{matrix}\right\}SO_4$, and the ethyl-sulphate of potassium has the composition $\left.\begin{matrix}C_2H_5\\H\end{matrix}\right\}SO_4$. In 1865 Calvert examined the white crystalline product which is formed when phenol is mixed with a strong solution of caustic potash, which was supposed to be a salt of carbolic acid; it was found that the crystals consisted only of phenol, with a little adhering alkali. There can be no doubt, therefore, that phenol belongs to the alcohols, and the sample of pure phenol which I place before you may be appropriately called "absolute phenol." It is prepared in the form of minute granular crystals, and having no tendency to liquefy on exposure, it will probably be found more convenient for pharmaceutical purposes than the ordinary solid mass which requires to be melted before using; it is quite free from tarry smell. Phenol is produced by the dry distillation of the following organic bodies besides coal, viz., Salycilic acid, gum benzoin, resin of xanthorrhæa hastilis, quinic acid, and chromate of pelosine.

$$\left(\text{Salycilic acid} = \left.\begin{matrix}C_6H_5\\H\end{matrix}\right\}CO_3.\right)$$

A large number of derivatives have been furnished by phenol, some of which are of considerable commercial importance, although they were not applied to industrial uses to any great extent until nearly 20 years after the discovery of phenol; in fact, this body has a commercial history similar to that of oxalic acid, benzol, and many other organic compounds, which after their first discovery were known for some years as chemical curiosities only, until at length they are found to possess qualities which make them useful to mankind, and render their manufacture a profitable enterprise. It is little over twenty years since phenol was first manufactured on a large scale, and at the present time the production in this country amounts to several hundred tons annually. A large proportion of this is consumed for manufacturing two coloured derivatives of phenol which are employed as dyes. I allude to picric and rosolic acids. When nitric acid is made to act upon phenol, three different nitro-derivatives may be produced by varying the conditions under which the action takes place. In all cases the action consists in the replacement of hydrogen by the group Nitryl, NO_2., and either 1, 2, or 3 atoms of hydrogen may be so replaced, forming the mononitrophenic, dinitrophenic, and trinitrophenic acids respectively.

Phenol.	Nitrophenic Acids.		
C_6H_6O.	$C_6H_5(NO)O$.	$C_6H_4(NO_2)_2O$.	$C_6H_3(NO_2)_3O$.
	Mono.	di-	tri-

The action of nitric acid upon phenol is extremely energetic, and even takes place with explosive violence if the two are suddenly mixed together in a concentrated form, so that in order to obtain definite results this action must be carefully regulated. All these nitro-derivatives possess distinct acid properties, and form definite crystallisable salts, but only the trinitrophenic or picric acid is of commercial importance.

Picric acid is formed when phenol or nitric acids are allowed to re-act upon one another, and the mixture is afterwards boiled with concentrated nitric acid. Pure picric acid crystallises in pale yellow needles, which dissolve in about eighty times their weight of cold water, forming an intense yellow solution.

Like many organic compounds which have had three atoms of hydrogen replaced by three atoms of NO_2, such as gun-cotton or trinitronaphthalene, picric acid, and especially the picrates, are liable to undergo violent decomposition when heated, the picrates of the alkalies exploding with much violence. (This was illustrated by firing a pistol loaded with 5 grains of potassium picrate). The most important application of picric acid is for dyeing silk and wool, to which it imparts a pure lemon yellow shade; the acid merely requires to be dissolved in water, with the addition of a little sulphuric acid, which is found to assist the process of dyeing. When a solution of picric acid is gently heated with cyanide of potassium, isopurpurate of potassium is produced; from this the ammonium salt can be obtained, which exactly resembles the dyeing material murexid, or purpurate of ammonium:—

$$C_6H_3N_3O_7 + 3CNK + 3H_2O = C_8H_4KN_5O_6 + CO_2 + NH_3 + 2KHO.$$

(The conversion was effected in a large flask, and the transition of the pale picric solution to the deep purple of murexid was strikingly shown).

The other coloured product derived from phenol is rosolic acid, known in commerce as aurine, or yellow coralline. This substance is produced when phenol is heated with an alkali together with certain metallic oxides, and also when sulphophenic acid is heated with oxalic acid to 120° C.; the last method is the one employed on the manufacturing scale. When the action is complete, the excess of sulphophenic acid is washed out by repeatedly boiling with water, and the rosolic acid is finally melted in order to remove the water which it has retained. On cooling, it assumes the condition of an amorphous mass, with beetle-green lustre, in which form it is known as aurine, or yellow coralline of commerce. In this state rosolic acid contains a quantity of unchanged phenol; when freed from this it may be obtained in the crystalline form.

Aurine is soluble in alkaline solution, and in alcohol; it is largely employed for dyeing silk and wool, to which it gives a bright orange colour, often seen on sheepskin mats. When aurine is heated under pressure with ammonia solution to 150° C., a colouring matter is formed which produces a red shade instead of the orange shade imparted by aurine; this substance is called red coralline. A blue colouring matter may be obtained from aurine by heating together aurine, anilin, and benzoic acid; this product, at one time rather extensively used, is now supplanted by the anilin dyes.

We have now completed the list of colouring matters which are derived directly from phenol, and it will be admitted that the contributions of this body to the great magazine of tar colours is by no means unimportant.

I now pass on to the consideration of some of the properties of cresylic acid or cresol.

The remarks already made with reference to the constitution of phenol will equally apply to cresol, this body being an alcohol and not an acid. Three isomeric modifications of cresol are known, which are distinguished as para-, meta-, and ortho-cresol, and these stand in the same relation to toluene as phenol does to benzene.

Toluene.	Cresol.
$(C_7H_7)O$	$(C_7H_7)OH$

Paracresol constitutes the greater portion of the crude cresol derived from coal tar; it is very deliquescent, and its presence in commercial phenol causes the latter to liquefy on exposure: its boiling point is about 200° C. Orthocresol is believed to exist in coal tar, but it has also been obtained (as well as paracresol) by fusing potassium toluene sulphate with potassium hydrate,

$$C_7H_7SO_3K + KOH = (C_7H_7)OH + K_2SO_3.$$

Its boiling point is about 189° C.

Metacresol has not been obtained from coal tar; it is formed by the resolution of thymol into cresol and propylene by heating with phosphoric anhydride; its boiling point is 195° to 200°.

$$C_{10}H_{14}O = C_7H_8O + C_3H_6.$$

The derivatives of cresol have not been so perfectly studied as those of phenol, partly in consequence of the difficulty of obtaining the different isomers in a state of purity in large quantities. None of them have yet been applied to any useful purpose in the arts or manufactures, but cresol is employed to a greater extent than phenol for purposes of disinfection. The antiseptic qualities of cresol and phenol have been carefully studied during the last ten or fifteen years, and a large amount of experience has been gained by their practical employment as disinfectants. These alcohols possess some property by virtue of which they are able immediately to arrest those changes in organic bodies which owe their origin to the development of protoplasmic life. This is not effected by oxidation or other chemical change, as in the case of the permanganates, chlorine, ozone, &c., for there is reason to believe that the antiseptics themselves suffer no change. Both phenol and cresol will precipitate albumen and gelatine from their solutions, and it has been suggested that they may exert a similar power on the sarcode which forms the structure of the above-named organisms. Whatever be the method by which the effect is produced, the fact itself is sufficiently established. This antiseptic quality was very soon recognised by medical authorities, and it was found that the usual septic condition of suppurating wounds might be entirely prevented by employing a dressing in which a small quantity of phenol or cresol was introduced. The subject was thoroughly investigated by Dr. Lister of Edinburgh, to whom we are chiefly indebted for the antiseptic method of treating wounds, and also for some of the very convenient forms in which the antiseptics are applied. The question naturally arises, if these antiseptics are so certain in their action upon the vital germs which accompany decay, might they not be useful agents for internal administration in those diseases in which the morbid state of the blood is supposed to be owing to the propagation therein of poisonous germs? Of course it is impossible to administer either phenol or cresol in a pure state, and even a weak solution is found too irritating for the delicate mucous surfaces of the stomach except in very small quantities, so that for some time the test could not be applied. Recently, however, it has been found that the salts of sulpho-carbolic, acid which may be given in tolerably large doses, are decomposed in the system, the phenol being reformed and set at liberty. By this method it is possible to administer phenol in such quantities as to produce cerebral symptoms, but I have not seen a sufficient number of reports as to its action to determine its success or otherwise. Numerous other applications of these antiseptics have been made and are continually being made as their properties become more generally known. I will only allude to the preservation of glue size in hot weather, and of hides that are intended for tanning. In conclusion, I would draw your attention to a few zoological specimens which were collected three years ago by my brother in India, and sent to England in a 2 per cent. solution of cresol: the state of preservation is complete.

ZYMOTIC POISON.*

ABOUT 100,000 persons are poisoned to death annually in Great Britain, of which upwards of 4,000 die in Glasgow. The number attacked, represented by these deaths, probably amounts to 10,000,000. This frightful mortality is not confined to our country, but prevails more or less from the same causes in every community in the world. This is no mere figure of speech in regard to the cause of death, nor simply an hypothesis as to the quantity of lives sacrificed. I mean what I say—these persons die by being poisoned, while the registrars' returns authenticate the number of victims. Doubtless some of you will be startled at this statement, and will be already reflecting on what can be the nature and source of the potent agent that plays such terrible havoc with human life. Of course, you will say, it cannot be any even of the most active poisons we have in our laboratories—it cannot be such as prussic acid, or arsenic, or phosphorus, or any of the salts of mercury; neither can it be strychnia, atropia, aconitia, conia, or digitalin—that we know is ridiculously out of the question. What, then, can it be? Is it of vegetable, animal, or mineral origin? Is it solid, liquid, or gaseous? Does it taste sweet, sour, bitter, nauseous, salt, acrid, or is it tasteless? Does it smell pleasantly, or offensively, or is it odourless? Is it transparent or opaque, coloured or colourless, acid, alkaline, or neutral? Has it any known reactions with chemical reagents, or other distinctive propensities by which it can be known? Is it a simple, binary, ternary, or quaternary body? What is its name? Who was its discoverer? Has it no antidote? In short, has it been seen at all?

Such a sequence of ideas is likely to evolve in the minds of you whose daily avocation brings you in frequent contact with the pharmacopœial poisons, the toxicology of which you are supposed to know. But the substance to which I allude in no way resembles any of the toxic bodies in the materia medica, excepting that it is in the fullest sense of the term "a deadly poison," and yet it cannot be contained in stoppered bottles, weighed in grains, nor measured in minims. Moreover, it differs from all other poisons in this particular respect, that while their actions are confined to the person affected, its action renders the individual poisoned poisonous. One may, without risk to life, attend assiduously upon, and sleep nightly in the same chamber with a patient suffering from a toxic dose of strychnia, opium, alcohol, &c., *qua* these bodies; but one who has not already been attacked by, and, of course, survived the conflict with this virulent entity in all its phases could not do so with impunity in the case of a person suffering from its effects. He or she might escape, but the peril incurred would be great, as the patient's blood undergoes a kind of destructive distillation, whereby it and the tissues are converted into poison, the body being often literally soaked and enveloped in an atmosphere of keen infection; saliva, urine, fæces, breath, sweat, and skin scurf, may all be saturated with it.

This baneful entity is known by the generic term zymotic poison, from the Greek word ζυμη, leaven, and a person under its influence is said to be in a state of zymosis or fermentation. It has received this name because, when it infects the blood, certain phenomena are evoked, very analogous to those caused by the addition of yeast to a substance susceptible of fermentation. Supposing it possible to add to an aqueous solution of grape, or other fruit juice, or a mixture of honey and water, a single cell of the yeast plant, *Torula cerevisiæ*; this speck of matter may be about the size of a human red blood corpuscle, that is about the 2,500th of an inch in diameter, and, of course, only visible under the microscope. Supposing, further, the solution is kept at a temperature near 70° Fah. Then in a few days, probably hours, from the single cell millions are generated, so as to render the liquid turbid, and form a scum at the top, and a sediment at the bottom. During this process the temperature of the fluid is sensibly higher than the surrounding medium, and carbonic anhydride is evolved in large quantity. Ultimately the escape of gas gradually ceases, and the saccharine solution is now found converted into a mixture of alcohol and water, incapable of further fermentation. Now, to illustrate the other side of the analogy, supposing I were to wet the point of a needle with the smallest possible portion of lymph from the body of a small-pox patient, and push it under the skin of a person unvaccinated, who had not suffered from small-pox, then, a thousand chances to one, in a few days, perhaps hours, the recipient of the lymph feels out of sorts—has headache, backache, nausea, vomiting, thirst, a high pulse, and hot skin. In about three days after the onset of these symptoms, a papular eruption appears on the body, which soon forms vesicles or blebs. These may be few or many, separate or confluent, but the clear fluid with which they are tumid has the same specific infective nature as that with which the needle was wet, which has obviously caused them; that minute portion having now probably multiplied to an immeasurable extent. If the patient survive, he or she is now insusceptible of a second attack of these symptoms, which I need scarcely say are those of small-pox, and the lymph inoculated by the needle is zymotic poison.

These, you observe, are both cases of pure infection, and the analogy is about as perfect as possible, considering that in the one case we are dealing with what, in a sense, is dead matter, and in the other with a living organism. You observed: 1. The minute speck of yeast and of small-pox lymph which evoked their respective phenomena. 2. The elevation of temperature in both cases—the fermenting liquid is abnormally warm, the small-pox patient highly fevered. 3. The enormous multiplication of the yeast and of the lymph. 4. The yeast frothing to the periphery or surface of the fluid, and the small-pox eruption forming, as it were, lymph bubbles on the skin. 5. Both are infectious—a portion of yeast from the alcoholic solution would cause fermentation, a portion of lymph from the inoculated patient would cause small-pox. 6. The alcohol will not again ferment, the patient will not again take variola. 7. The saccharine solution will ferment, as it were, spontaneously, because torula cells are constantly floating about and fall on its surface—so may a person, as it were, take small-pox spontaneously, by breathing air contaminated with that specific poison. These are also both cases of pure infection, though in neither is the infecting agent previously visible.

---

* A Lecture by John Dougall, M.D., delivered before the Glasgow Chemists' and Druggists' Association, Anderson's University, December 23, 1874.

Now, I have chosen small-pox to compare with fermentation simply because it is a typical species of the genus zymotica, the other chief members of which are scarlatina, measles, diphtheria, typhus and enteric fever, and cholera. These diseases are generically related, in respect that they are caused by a something which, entering the blood, reproduces itself enormously, rendering the secretions and excretions of the affected person poisonous if inhaled or swallowed by a healthy individual susceptible to their action. Also that they commonly only make one attack, and always cause a hot skin and high pulse. Their specific differences are so remarkable and distinct that, with few exceptions, physicians think each zymotic disease caused by a separate poison. For example, the doctor may be called to see a patient who sickened two days before, and finds him complaining of thirst and headache; he is fevered, prostrate, the eyes suffused, the tongue probably dry, furred, and studded with red points, the throat swollen and tender, and the skin covered with an exuberant efflorescence of bright scarlet dots, and he pronounces the case scarlatina. Or the patient may have swelling of the eyelids, with eyes red, watering, and intolerant of light, sneezing, dry cough, and hoarseness, with difficulty of breathing. On the fourth day of the fever the skin gets covered with small red dots, which coalesce into slightly raised crescentic blotches, and the case is diagnosed as measles. Or the patient may have stiffness about the neck, slight diarrhœa, nausea, pain on swallowing, salivation, fetid breath, the back part of the throat covered with specks or patches, like damp, dirty, wash-leather—symptoms indicating diphtheria. Or the patient may have frequent chills, a soft pulse, dry brown tongue, constipated bowels, heavy, flushed, smoky countenance, stupor, prostration, wakefulness, delirium. About the seventh day of the fever the skin is covered with irregular spots of a dusky or mulberry hue, at first disappearing on pressure, slightly elevated, but soon becoming persistent—symptoms showing the case to be typhus fever. Or the patient may have pains in the limbs, great weakness, loose bowels, with very offensive stools, which may contain blood, glazed dry tongue with ammoniacal breath, a pale languid face, with a hectic flush on each cheek, clear eyes with dilated pupils, and the mental faculties unaffected. About the eighth day a few elevated and isolated rose-coloured dots probably are found on the abdomen or chest, vanishing on pressure, appearing in successive crops, which last two or more days; and the doctor finds himself face to face with enteric fever. Or the patient, quite well a few hours before, may have severe diarrhœa, with evacuations like rice-water, cramps in the limbs, causing the muscles to be hard as wood, or contracted into knot-like masses; the circulation and respiration impeded; the nose, tongue, ears, breath, and extremities icy cold; the lips and general surface blue or livid; the eyes sunk, the pupils contracted and fixed, the complexion muddy, and the features pinched; the whole body shrunk and intensely prostrate; perhaps death taking place before the doctor has time to prescribe for what is too obviously a case of Asiatic cholera. The differences in the symptoms of these diseases are held as sufficiently pronounced to justify medical practitioners, as already stated, in regarding them specifically distinct. But, moreover, they have other characteristics which seem to prove this beyond a doubt. Supposing a person exposed to any of these distempers, and becoming infected, he would only suffer from the symptoms peculiar to the virus he had imbibed; if it were that of scarlatina, he would be affected with scarlatina only; and should he infect others, it would be with scarlatina and not small-pox, typhus, or cholera; and so with the others, each producing offspring identical in kind, though varying in degree, with the primary poison. Another strong proof of the specificity of the causes of zymotic diseases is the fact already noticed, that one attack usually confers immunity from a subsequent attack of the particular disease with which the person is affected. Furthermore, an attack of one zymotic affection does not confer exemption from attacks by the other members of the group. Notwithstanding these strong and convincing proofs that zymotic diseases are the results of specific causes, some have endeavoured to show that there is one common cause to all, and that the variety in the disease depends upon the channel by which the noxious agent enters the body. If it come directly in contact with the blood it is said to cause syphilis, dissecting wound fever, and other cognate diseases; if swallowed, enteric fever and cholera; if breathed, scarlatina, measles, &c. These views are especially advocated in a pamphlet published three years ago on the correlation of zymotic diseases, by Mr. Wolff, of London; and although, judging from the present state of our knowledge, it is possible he may, to a certain extent, be correct, still a large balance of evidence points in the opposite direction. For example: Small-pox matter only produces small-pox, by whatever channel it enters the body. I now come to consider the probable nature of zymotic poison. This question has engrossed the attention, and, I may say, baffled the skill, of the most profound thinkers and patient workers in medical science. It has been fertile in endless and fruitless discussions; it has elicited untold, deeply interesting, but unprofitable memoirs; it is susceptible of the most ingenious, fascinating, but vain speculations; and has been the incentive to numberless of the most delicate, protracted, and even dangerous but withal valueless experiments. All the logic of the reasoner, all the results of the experimenter, anent the nature of zymotic poison, have hitherto practically ended in vague theories and conflicting hypotheses. Such being the case, you will not of course expect a solution of the question from me; I can only promise to lay before you some of the more prominent points on which observers have dwelt, and some of the conclusions at which they seem to have arrived.

There are two leading theories extant of the nature, origin, and operation of zymotic contagia—viz., the germ theory, and the physical or physico-chemical theory. Believers in the germ theory hold that zymotic diseases are caused by living vegetable organisms or ferments, or fungus spores, which, entering the body, reproduce themselves, and pass through various changes that evoke the characteristic phenomena pertaining to the special organism in the body, which may be a scarlet-fever germ, a small-pox germ, a cholera germ, &c., each disease having its special ferment or germ. This theory is founded on the analogy between zymotic disease and fermentation already noticed, and also putrefaction, because the blood and other fluids in the body of a zymotic patient seem undergoing a putrescent change. The germ theorists also affirm that putrefaction, in all its phases, is originated and maintained by germs which, especially in densely populated places, are floating in myriads in the atmosphere, and only need a congenial soil, such as dead organic matter, or a weakly vital organism, in a condition favourable for their reception, to set them fructifying. Now, in order that you may fairly comprehend the theory, it is necessary to say something of putrefaction. If a portion of urine, blood serum, flesh-water, or other animal fluid be set aside for twenty-four hours, and then examined microscopically, it will be found swarming with organisms in active motion, called generically, monads, bacteria, and vibriones. The first, from their being the smallest and simplest of all animalcules, measuring from 1-40,000th to the 1-100,000th of an inch; the second, from their rod-like shape, and the third from their vibratile movements. The fluid also soon gets slightly turbid, and distinctly fetid; its reaction is neutral or alkaline, but never acid. It continues thus about twelve months, when the organisms, turbidity and fetor, gradually disappear, and it now gives no response to the tests for albumen. These are the chief physical phenomena constituting putrefaction, and bearing on zymotic disease. But if a portion of any of these substances be put into two flasks and boiled a few minutes, and during ebullition the necks of the flasks stuffed with cotton wool, and the steam allowed to issue through it a short time, and if the flasks be now set aside, their contents will be found, months after, pure and unchanged. If the plug be now removed from one of the flasks, then in a few days its contents will begin to putrefy, while those of the other flask keep sweet and clear. Furthermore, if a portion of a putrescible fluid be boiled in a flask with the neck drawn out into a tube and bent downwards, and if the tube be heated so as to destroy any particles present in the air which enters the flask as its contents cool, these will keep pure and fresh for an indefinite time; nay, here is such a flask (flask shown) with fresh-water boiled in it ten months ago, and where the tube was not heated as the contents cooled, and yet these show no signs of decay. Again, if the bent tube be broken so as to leave about an inch projecting from the neck of the flask, the result is the same as the withdrawal of the plug of cotton—in a short time the contents putrefy.

Now, these experiments show it is not the air which causes putrefaction, because the cotton-wool is pervious, and the bent tube open, neither can the cotton have any antiseptic action on the fluid, nor chemical effect on the air, because, as in the flask with the bent tube, it is dispensed with altogether, and yet the result is the same. The cause of putrefaction must therefore be something in, but distinct from, the atmosphere, and this something is obviously filtered by the wool from the air entering the flasks, while it cannot fall into the bent tube, as the orifice of the latter looks downwards, and, there being no currents in the flask, neither can it rise upwards in the tube.

Now, for no other reason that I know, than that monads, bacteria, and vibriones, are found in all putrefying fluids, the germs of these organisms are said by the germ theorists to be *the something* that is stopped by the cotton and by the tube. M. Pasteur, a distinguished French micrologist, a brilliant experimenter, and chief of the germ theorists, has, it is said, even seen those germs in cotton-wool which had served as a filter in such experiments. Not only so; he has, by an ingenious process, actually managed to sow them in nitrogenous soil, and they gave rise to living organisms. Now this looks very beautiful, but I am sceptical about it. Let it be admitted, however, that *omne vivum ex vivo*, that no plant or animal, however minute, arises *de novo*, but springs from a pre-existing germ. What, then, must be the size of those germs which give rise to organisms of about 1-40,000th and less of an inch in diameter? A drop of a putrid solution, according to Ehrenberg, contains as many as there are human beings on the surface of the globe, viz., about 500,000,000. Why, if their germs bear the same proportion to their adults as that which obtains between the germs of plants or animals familiar to us, and those when fully developed, the difference in some cases may amount to no more than tens of thousands, but in others it must be hundreds of millions. Compare, for example, an acorn with an oak; a turnip seed to the large succulent bulb it produces; the human germ measuring about the 250th part of an inch, to a man weighing sixteen stones, and it will be obvious that the germs of organisms in putrefying fluids, if such exist, are minute beyond comprehension, and that the highest powers of the microscope must ever be immeasurably inadequate to detect their presence. But it is by no means proved that all life comes from pre-existing life. The ingenious and apparently exhaustive experiments of Dr. C. Bastian are to my mind as convincing as those of M. Pasteur, and these go to prove that many minute organisms arise *de novo*, or, in other words, that life may spring from that which has no life. Dr. Bastian, while admitting that urine, weak infusion of turnip and of hay, boiled in flasks with bent necks or with necks stuffed with cotton wool, may remain for an indefinite period without becoming turbid or undergoing any apparent change, has found that if the turnip solution be neutralised by ammonic carb. or liq. pot., or even if half a grain of new cheese be added to the infusion before it is boiled, the fluid soon gets turbid, owing to the appearance of multitudes of bacteria. In short, he has shown that in these experiments only certain weak nitrogenous fluids do not change, while solutions of a more complex nature produce living forms in abundance.

Dr. Bastian, in his experiments in proof of spontaneous generation, used various strong infusions, chiefly of hay and turnip, these being highly suitable for the existence of bacteria, &c. A portion of the fresh infusion is put into a flask and boiled for ten minutes, so as to destroy any minute organisms present, these being killed by a temperature of 212° Fah. During ebullition the neck of the flask is heated and hermetically sealed by the blow-pipe, the bending inwards of the red hot-glass showing a partial vacuum within. The bulb of the flask is then immersed in a water bath, and maintained at a temperature of 80° to 95° Fah. The result is that in the great majority of cases, after the lapse of some hours or days, the fluid becomes more or less turbid, and when examined by the microscope is found to contain bacteria and other allied forms. Dr. Bastian says he has taken organisms from flasks that had a few weeks before been hermetically sealed and heated for a variable time to temperatures ranging from 260° to 302° Fah. He therefore concludes, and I think fairly, that these organisms must have arisen *de novo* from the fluid in the flasks. Now, here are two theories equally striking, and both founded on experimental evidence, and while it is difficult to arrive at any other conclusion from Dr. Bastian's experiments than that life may spring from dead matter, there is also some difficulty in rejecting those of M. Pasteur, which, he thinks, prove that all life is derived from previous life. Possibly microzymes arise *de novo*, and also propagate biogenetically. The fact, however, remains that minute organisms are present in all putrefying solutions, whatever way they get there, and while the germ theorists assert they are the cause, there are others who maintain they are the result of putrefaction; the former also consider their *rôle* as malignant, and the latter as benign. The chief points adduced to show that bacteria, &c., are the cause of putrefaction, and fungi the source of many plant diseases, are—1st. Their presence in all putrefying fluids. 2nd. Their absence in all fluids not putrefying. 3rd. It is asserted that many diseases both of animals and plants are caused by living organisms, such as animal parasites and fungi. The opponents of this theory hold that these organisms are the result of the conditions of their habitat, and their concomitants. 1st. Because, whether bacteria or fungi, they are only found on the parts of animals or vegetables with lowered vitality, or in their dead tissues. 2. By increasing the vitality, or antisepting the dead tissues, they disappear. 3. Contagious virus is destitute of the qualities of any known vegetable or animal parasites. 4. No specific virus can be made to yield any specific organism. 5. When microzymes appear in infective matter it ceases to infect. The first set of these propositions imply that the functions of microzymes are hurtful, while in the second set a benign *rôle* is attributed to them, and I think rightly. Professor Owen, with that wide grasp of intellect which marks all his works, and in that ornate diction with which he clothes all his conceptions, tells, in regard to the uses of infusoria, what may well be called "a fairy tale of science." "Consider," he says, "their incredible numbers, their insatiable voracity, and that it is the particles of decaying vegetable and animal bodies they are appointed to devour and assimilate. Surely we must in some degree be indebted to those over-active invisible scavengers for the salubrity of our atmosphere. Nor is this all. They perform a still more important office in preventing the gradual diminution of the present amount of organic matter upon the earth; for when this matter is dissolved, and suspended in water in that state of comminution and decay which immediately precedes its final decomposition into the elementary gases, and its consequent return from the organic to the inorganic world, these wakeful members of nature's invisible police are everywhere ready to arrest the fugitive organised particles, and turn them back into the ascending stream of animal life. Having converted the dead and decomposing particles into their own tissues, they themselves become the food of large infusoria and of numerous other small animals, as the rotiferæ, which in their turn are devoured by larger animals, as fishes, and thus a pabulum fit for the nourishment of the highest organised beings is brought back by a short route from the extremity of the realms of organic matter." It would take too much time to discuss this part of our subject further. The points I have noticed are among the chief ones of the germ theory, and I consider there is a large balance of evidence proving that bacteria and fungi in dead matter, also the various animal and vegetable parasites of living organisms, are absolutely non-zymotic, the result and not the cause of the morbid conditions of their habitat; a similar conclusion having also been recently arrived at by a commission appointed by a foreign Government to inquire into the cause of the grape disease.

I now come to consider the physical theory. This theory, first propounded by Liebig, regards putrefaction as "a transformation or new arrangement of the atoms of a compound yielding two or more new groups, and caused by contact with other substances, the elementary particles of which are themselves in a state of transformation or decomposition. It is a communication, or an imparting of a state of motion, which the atoms of a body in a state of motion are capable of producing in other bodies, whose elementary particles are held together only by a feeble attraction."

Now, according to this view, that which is intercepted by the cotton-wool and the bent tubes of the flasks already noticed are not microzoa, but portions of dead organic matter in a state of transformation or decomposition, and these exist everywhere in the atmosphere near the earth's surface. In a pencil of solar rays entering a dark room by a hole in the shutter, myriads of floating particles are seen, which have been proven organic. Professor Tyndall has imitated this phenomenon very successfully in a beautiful experiment. A powerful beam of electric light is shot across a darkened space, which shows the air to be a mere stirabout of extremely minute particles. If a person breathe directly into this light, the particles are much agitated and increased for the time. But if the breath be blown upon it through a tube with one end covered by cotton-wool, or if a red-hot iron ball be held close below it, in the first instance a black band cuts the beam in two where and when the breath meets it; and, in the second place, one or more inky fluctuating zigzag blots appear and disappear transversely in the beam immediately above the ball. Professor Tyndall has satisfactorily demonstrated that optically pure air is black, and these bands and blots are considered as such. Air from the lungs and the air of a room contain particles of watery vapour and of organic matter. When the breath is blown through cotton-wool it arrests them, while those floating above a red-hot ball are rarified and burnt. Hence the transient black bands and tortuosities in the electric beam. Now, I have frequently examined, microscopically, the cotton-wool used in Pasteur's experiments to filter these particles, and although a very few bodies resembling sporules and diaphanous cells were found, yet the greater quantity of the particles adhering to the fibres were polymorphous or amorphous, opaque or semi-opaque, with ragged edges, and of various sizes, and presenting no signs of organisation, and all the aspects of organic *débris*.

Believers in the physical theory thus hold that putrefaction is not caused by, and zymotic poison does not consist of, living germs. They contend that putrefaction, as stated, is propagated by contact with minute portions of putrid matter, which also is the mode of multiplication, and the form assumed by zymotic poison, whether it be expired from the lungs, exhaled from the skin, or ejected from the bowels. They, moreover, concede that each communicable disease has its specific poison, but deny that the poison causes disease by an inherent self-reproductive power. Zymosis, they consider, is continued from person to person by the virus imparting its condition to individuals, which contain in themselves that which is capable of being changed into the poison. Perhaps the most feasible enunciation of the physical theory is that of Dr. B. W. Richardson, of which the following are among the chief points:—"Zymotic poisons are organic products derived from the secreted fluids of the body, so that a zymotic patient is poisonous precisely as a cobra di capello is poisonous; he is secreting virus, which, by contact with a healthy person, may cause disease. As each secretion of the body in its healthy state has specific properties, so each in its diseased state acts as a specific poison, and, from its local position when thus acting, peculiar local symptoms are set up characteristic of the disease. There is thus a different secretion forming a pabulum for each poison, one for small-pox, one for scarlatina, and so on, the one virus not thriving on the food of its neighbour, but electing its own secretion. This is said to explain why one poison does not produce the symptoms of another. According to the germ theory each zymotic case yields an enormous number of germs, all of which retain their vitality amid extreme temperatures, so that the wonder is the world is not depopulated with them. But the physical theory places zymotic virus under the same atmospheric influences as other organic matter, whereby it is soon reduced to elementary forms. Hence the dead are not contagious, and epidemics cease." Dr. Richardson also considers that zymotic poison may, under certain mal-hygienic conditions, arise, *de novo*, in the secretions, from which effects follow precisely as though it had been introduced into the body; and attributes the immunity from, or tendency to, zymotics at various ages to a constitutional or physiological peculiarity of secretion; and the non-recurrence of the same disease in the same person to the elimination of particles in a secretion susceptible of zymosis.

It seems to me strong proof in favour of the physico-chemical theory that certain epidemic distempers—sweating sickness, plague, and black death, have ceased to be. It may be mentioned that during one night in London the plague caused 4,000 deaths, and in one week 12,000. If these depended on germs, whither have the germs gone? and, moreover, where were the germs of cholera previous to its appearance on the Ganges' Delta? I think it more likely these diseases did not arise from germs at all, but from putrid poisons generated, *de novo*, both in and out of the body, but chiefly the former, from abounding decomposing organic matter, the deplorably filthy habits of the people, and their abject ignorance and systematic violation of the laws of health, and were propagated also in accordance with the physical theory. Further, as their extinction is unquestionably due to increased knowledge and improved sanitary conditions, may it not, therefore, be reasonably expected to exterminate scarlatina, typhoid, and their allies, by the same means, as it seems to me highly probable they arise and disseminate in a similar manner.

But still we have to consider the important question, What is the specific nature of zymotic virus? Be it living germ, putrid particle, or vitiated secretion, if it be at all tangible, what does the microscope or test-tube say about it? Briefly, it must be admitted, that all the most refined and ingenious methods of research, as to the presence or properties of the mineral and vegetable poisons, physical, physiological, toxicological, or antagonistic, afford but a tantalising, yet withal, encouraging glimmer of light, when applied even to reveal the presence, let alone unmask the specific *zymes* of zymotic virus. But most of the great discoveries of science, now shedding their benign rays over the whole earth, appeared at first like the phosphorescent scintillæ on the abdomen of the glow-worm under the hedge. So may this feeble glimmer, probed by constant experiment, and fanned by the breath of increasing knowledge, flame into radiant, far-reaching, and enduring shafts of intellectual light.

The proximate infecting principle of one of the most virulent of the zymotica, viz., the lymph of small-pox, is easily procured, and in sufficient quantity for examination.

This substance, also cow-pock lymph, is fluid, translucent, odourless, alkaline, and coagulable. Under the microscope both are found to contain numerous particles about 1-20,000th of an inch in diameter. By an ingenious application of the law of diffusion of fluids, M. Chauveau and Dr. B. Sanderson managed to separate the particles from the fluid parts, and it was found that a child may be vaccinated or inoculated successively with the fluid, but without effect, while the minutest portion of the solid parts that can be separated is sufficient to originate all the phenomena of cow-pock, or of variola. Now the specific virus of the other zymotic diseases, such as scarlatina, typhoid fever, &c., has not yet, in reality, been isolated, but it may be safely predicated that if they too contain particles these must be smaller than a blood-corpuscle, that is, less than the 1-4,000th part of an inch, because, if larger, or of equal size, they could not penetrate the membrane of the lung cells when inhaled, nor the vascular tunics when swallowed, to pass into the circulation, as what keeps the blood corpuscles in, must keep particles larger, or of equal size, out. But, supposing these contagia to consist of minute entities of putrid amorphous matter, then they need not be so small as a blood corpuscle, because mere contact with the pulmonary membrane, or any moist absorbing surface of a susceptible organism, would be sufficient, in accordance with the physical theory, to initiate zymotic phenomena conformable to the nature of the primary contagium.

At present it must be confessed, as already stated, that of what the infecting principles of zymotic contagia consist no one knows! The discovery that the particles in vaccine and variolous lymph are the essential virus of these substances is one of the golden grains of fact that have been washed out of the worthless sands of hypothesis, but as regards their particular constitution, again the sum of our knowledge is, no one knows! Furthermore, the splendid discovery of Jenner of the protective influence of vaccination has, as you know, enshrined his memory in imperishable characters on the escutcheon of science, and excited the wonder, admiration and gratitude of the civilised world. But why the particles of vaccinia prevent the development or generation of the particles of variola, the sum of our knowledge again is, no one knows!

I cannot avoid mentioning here that previous to Jenner's discovery, nay, for some time after he had made it known, and while he worked on crystallising his sublime idea, imbued with the true spirit of a philosopher, nathless for the drenching shower of epigrams, and lampoons, and caricatures of men with cows' heads, directed against it, in Europe alone 400,000 persons were dying annually from small-pox, while the same number were disfigured from its effects. At present the mortality from this disease is approximatively only about a fifteenth part of what it was before the introduction of vaccination. It has been well said that he who disputes the benefits of vaccination is as unreasonable as he who opposes in like manner any proposition in Euclid.

Regarding the origin and phenomena of zymotic disease, a recent writer observes: "The more we reflect on the life history of contagion, the more puzzled we become; the more we reach after this subtle poison, the further it seems from our grasp; the more carefully we lay hold of one fact after another, the greater number of new facts spring up, mushroom like, before us."

In conclusion, as your profession is closely allied with medicine, it is likely some of you may become medical practitioners. To those I would say, then you will frequently find yourselves wrestling in hopeless conflict with this terribly unequal antagonist. The learned, illiterate, rich, poor, young, old, it spares none of them—then, often amidst the entreaties of children to save a parent, or parents their children,

Before zymosis' fevered fingers
Hath swept the lines where beauty lingers,

you will realise how contemptible and impotent are all your powders and potions, and numerous devices to thwart, in the smallest degree, the fatal issues of these protean maladies; and baffled and beaten, wish in your inmost heart for another Jenner—a Jenner of the nineteenth century, who by some weird alchemy will charm and chase away for ever those dismal death's-head shadows that, with leprous wings distilling poison, are constantly swooping unseen and noiselessly upon us, darkening our homes and desolating our hearths, ruthlessly lacerating the tenderest ties of human sympathy, and cruelly strangling the fondest hopes of human love.

THE MAMMOTH CAVE OF KENTUCKY.

In our October number we presented a sketch from the pen of our esteemed contributor, Professor Bedford, of New York, describing his trip to Louisville, in connection with the meeting of the American Pharmaceutical Association in that city last summer. It may be remembered that the writer promised to send us afterwards an account of the visit paid by the Association to the Mammoth Cave of Kentucky, one of the veritable wonders of the world. We duly received the account, but pressure on our space compelled us to hold it over until now:—

The afternoon was warm as we started from the hotel, the thermometer ranging somewhere about ninety in the shade, and, as the temperature in the cave is always about fifty-nine degrees, never varying more than a degree or two at most, the change was as marked as though we were walking into a bath of cold water. Passing down a flight of stairs on the right side, and behind a small stream which drops upon the rocks below, we enter the cave. The passage contracts for a short distance, and here an iron gate is passed. At the entrance the lamps are all lighted, each person carrying one, and, under the guidance of Matt, the oldest coloured guide, and two others, we proceed. The rock from which this vast cavern is formed is a limestone, and the entire excavations, wonderful as they are in form, variety, and extent, are due solely to the mechanical and chemical action of water. The chemical action is due to the carbonic acid contained in the water, which, dissolving away portions of the rock, as well as the wearing or mechanical action of the water itself, has formed these stupendous scenes through which we are to pass. As we progress on our walk, evidences of this action of water accumulate, and we gaze with wonder on the scenes around us.

But we had just passed the iron gate, and each one of our party receiving a number (so that we might easily discover when one should have strayed away), we are told that there are sixty-seven of us; with one exception, the largest party that ever entered the cave at a single time.

A very short distance beyond the entrance we find excavations, and large tanks built of logs and cemented roughly; and our guide tells us that during the war of 1812 saltpetre was manufactured here on a large scale. During the recent war, the cave was made a receptacle for the supplies of a portion of the Confederate army, Bowling Green, one of the leading posts in Kentucky, being but a short distance from here. As we pass on, we enter the Rotunda, the ceiling here being about one hundred feet above the floor, and the diameter of this sphere at one point is nearly two hundred feet. The Rotunda is said to be just underneath the dining room of the hotel. There is great uncertainty about the locality of some of the points of the cave, as compared with the outside world, as it has never been carefully surveyed, and the owner will not permit surveying instruments to be taken in. Beyond this is Audubon's avenue, named after the famous naturalist, and at the farther end of this we pass two buildings of stone, which our guide calls "the invalid's cottages." Some thirty years ago an invalid came to this locality to stay for a while, and passed much of his time in the cave. His health improving, he naturally attributed it to the influence of the even temperature of the cave. This apparent cure becoming noised abroad, led quite a number of persons to try this residence, and some thirteen frame buildings were constructed. The result of the experiment was, however, disastrous, and the frame houses long ago disappeared. One of the stone buildings which remain was used as a dining room.

Our party, led by the guide and his assistants, press on, and our attention is called to the Methodist Church, a large opening in the rocks some eighty feet in diameter, and forty or fifty feet high. From a ledge of rock about eighteen or twenty feet above the floor, preaching services used to be held for the benefit of the saltpetre workers in 1812. Three years ago some of our members, on their return from the meeting in St. Louis, visited the Mammoth Cave, and, it being Sunday, they had a part of the Episcopal service read in this portion of the cave.

On our right the guide tells us to observe the "Giant's Coffin," an immense rock about forty feet in length, twenty feet wide, and ten feet high. It was at some far remote period detached from overhead, and lies here now, a wonder and a curiosity. It has some slight resemblance to a coffin, and from this obtains its name. Just beyond, on the ceiling overhead, a formation of efflorescence of dark limestone on a surface of white has a wonderful resemblance to the ant-eater, and is so called. There are other formations of similar substances of curious appearance, and have each a name indicating their resemblance to certain fancied realities.

Not far from this is perhaps the most brilliant and attractive feature of the cave—the Star Chamber. The width of the passage is here about seventy-five feet, nearly as high, and about five or six hundred feet in length. The side walls are almost perpendicular; the ceiling almost as level as those of our own rooms. As we pass along, the guide requests us to take seats, said seats being a place on some long logs; and then gathering eight or ten oil lamps in his hand, requests all others to be extinguished. You do so, and, on looking overhead, directly through the opening in the rocks and beyond, you see the sky and stars. It is a clear, starlight night, and you see them as plain as can be. But it is not so! The illusion is perfect. The sky overhead is the rocky roof, and the stars are simply spots where the black gypsum has scaled off, and the white points beneath it reflect the light so that you cannot at first doubt but that you see real stars.

The guide now disappears, and as he recedes behind the rocks, he moves his lights in such a manner as to show the apparent movement of clouds in the sky, and the approach of a storm. But another movement of the lamps, and at the same moment he assures you that the clouds have blown over, and starlight is again seen. He then disappears by some unseen passage, and you are plunged into the very blackness of darkness. You await calmly his reappearance. In the distance the crowing of the cock is heard, then the barking of dogs, the lowing of cattle—all betokening the rising of the sun. A moment, and a streak of light indicates the early dawn. It grows brighter, and in a moment more not "old Sol" appears, but old Matt and his lamps, and, apparently, he feels quite happy as we compliment him on his excellent imitation. We remain a few moments gazing on that wonderful resemblance to the vaulted heavens, then, relighting our lamps, journey on.

But space and your patience, good readers, will not permit the mention of more than a few of the wonderful things that are to be seen, nor can any one reproduce, by the aid of pen alone, any adequate idea of the wonder, beauty, grandeur, or vastness of the scenes through which we pass. I feel as though it were a hopeless task. But we pass on, and enter a passage which is three quarters of a mile in length, about fifty feet to the ceiling, which is quite flat, and the width some one hundred or so. We pass into another rotunda, some four hundred feet in diameter, with a flat ceiling, but the floor of which is so irregular that it varies from ten to fifty feet in space between floor and roof.

A moment more, and we approach an opening beyond us, and find a natural breastwork, so that we appear to look through a window before us, and, by the aid of a bright illumination, we see an opening beyond, nearly circular in shape, with apparently carved columns of elegant design. Peering over cautiously, you look down, and below you, at the depth of about one hundred and twenty feet, is the floor, while the dome overhead is fully eighty feet above you. The sight is awfully sublime. No words can do justice to the scene.

Mammoth Dome, another similar wonder, is still larger, for it is some two hundred and fifty feet in height, and probably over one hundred and twenty feet in diameter, the sides of it having, in one place, some columns so wonderfully perfect that they are called the Corinthian columns. But I fail to recall the order in which these scenes were viewed, and can only recall them in general.

Having viewed these and some other wonders, we return to the hotel, having been gone some five hours, and travelled about eight miles; and, enjoying a wash, we sit down at ten o'clock at night to supper.

After supper some remain on the piazza listening to the music, and shortly after we induce a young "fifteenth amendment" to give us the regular "Virginia breakdown," which he did to the pleasure of all. That hour on the piazza viewing the dancing (quadrille and jig) with the peculiar plaintive strains of music, was the nearest approach to "Southern style" I saw in my trip. Our numbers thin out, and I seek the room assigned for my frail body. The room is capacious—one of the largest in the house—but its adornments and conveniences are scanty. It is the ball room, and some fifteen are assigned to pass the night there. *Five of us on two mattresses*, and all delicate youths like myself.

At early morning we are called, endure another poor meal, and at a little after nine o'clock our party start for the cave to take the "long route." There are fifty-seven of us in all. Among the number are some fair friends from Cincinnati, New York, Boston, Philadelphia, Louisville—twelve in all—and bravely they went through the journey; yet I doubt if any one of them would take a mile walk at home. We pass over a part of the route of the preceding day, until, reaching "the Giant's Coffin," we turn through a narrow passage, and enter the "Deserted Chamber;" thence to the "Wooden Bowl Cave;" and quite a walk before us is without any particular interest. At times we clamber over rough stones which seem thrown about in a very promiscuous manner, and in a few moments are on a good gravel walk. At other times we pass through places where the floor is strewn with incrustations which have fallen from the roof overhead, and a short portion of our route is a miry clay. Minerva's Dome is small as compared to others in the cave, being but fifty feet high, and not over fifteen feet in diameter; but when illuminated by the magnesium light has an exceedingly handsome appearance. Some distance beyond this is the Bottomless Pit, which is nearly two hundred feet deep, and about twenty feet in diameter. From the "Bridge of Sighs" a good view is obtained, especially when the guide lights a large wad of oiled paper and throws it down into the abyss.

A small dome, called "Shelby's Dome," is said to be directly overhead the Bottomless Pit, and, as the dome is some sixty feet in height, and there must be quite an intervening space between the two, besides the space between the top of the dome and the surface of the ground above, it is safe to say that the floor of the Bottomless Pit is over four hundred feet below the level of the ground over it. Revellers' Hall is a wild, large room, which is frequently used as a lunch room by parties who are visiting the cave.

To enumerate all the places of interest would be beyond the limit of your columns, and I pass on. We come to a winding, sunken walk, which reminds one of a brook forming a series of windings, something like the letter S; and you walk through this dry brook. The rocks come up from two to three feet high on either side of you, and you *must* pass between them, for it is not high enough for you to walk on the higher portions on either side. This tortuous path is about one hundred and seventy-five feet in length, and in some places so narrow that *I had to walk sideways*. This place is the famous "Fat Man's Misery." At the further extremity the ceiling is very low, and the tall ones of the party were *taken down*, so I had my revenge.

Having passed "Fat Man's Misery," we enter the capacious space known as "Great Relief," which is a place where large parties generally stop to rest a few moments, and of course the "heavy weights" have to stand considerable bantering. Again we start on our way over a good gravel walk, passing through an avenue known as "River Hall." Soon, however, we find the walk more difficult, and a clay mud threatens to unshoe us.

Our guide takes us to a passage leading off from "River Hall," and we enter the "Bacon Chamber." This has a low and very peculiar ceiling, for the formation of the rock on the roof, as viewed from a short distance, has an appearance like that of an immense number of hams hanging from it. The name is certainly well given, for the resemblance is very distinct. This formation is due entirely to the chemical action of water charged with carbonic acid.

Near this place is a magnificent arched passage called "Pensacola Avenue," which is from forty to sixty feet or more in width, varying in height from ten to sixty feet, and quite a mile in length. The ceiling and side walls have, in many portions of this avenue, splendid incrustations of lime salts; and being quite white, make this avenue a pleasant and beautiful walk.

In this avenue our attention was called to many interesting appearances; among them was a formation of stalactites called the "Pine Apple Bush;" and not very far from this is "Grand Crossing," a place where no less than four avenues branch off.

We are again in "River Hall," and on our way to the lake and river beyond us. We pass a small sheet of water called the "Dead Sea," and from the cliffs, some forty feet above it, look down upon the dismal "sea."

Passing down a staircase, and crossing a small watercourse, we soon reach the "Natural Bridge," and on this, at an elevation of some thirty or more feet, cross the "River Styx."

Beyond this we reach "Lake Lethe," and here most of the gentlemen are sent through "Purgatory," an avenue leading around the lake and beyond to "Echo River," while the ladies, with a few of their escorts, are put into flat boats, and start off for the regions beyond. Being among those doomed to go through "Purgatory," we took our departure. This route has an appropriate name—all assented to that—for it was a tedious and hard road to travel, and at its end we had to wait patiently (in the miry clay) for the return of the boats. About ten persons can be taken in each boat, and slowly we pass along "Echo River," a distance said to be nearly three-fourths of a mile in length. It varies in width from thirty to over two hundred feet, and the depth was stated by the guide to be at that time about twelve to thirty feet, though in some parts it is very shallow. The ceiling overhead is an arch of limestone, and at some parts of the river the echo is wonderful.

After travelling through "Silliman's Avenue" (named after the distinguished chemist), we notice in the distance the reflection of light, and quickly discover that our lunch is all ready for us. "Washington Hall" is the name of our dining-room; and our guides had sent there before us some assistants heavily laden with "provender." Our party arranged themselves rather promiscuously, and without much ceremony, and with very few specimens of china ware or any other ware to be found, they resorted to primitive plates; and adopting the motto that "fingers were made before forks," managed to put a goodly share of those provisions out of sight. We were now some seven miles from the mouth of the cave.

On our return, our boat ride was longer than before, and fortunately we did not go through "Purgatory" again. In several places the rocky roof was so low that we could not sit upright in the boat, and one of our party will well remember how near he came to losing a good hat, while another nearly lost some valuable tresses (purchased at great expense), by holding their heads too high!

At some point on the route, the locality of which I cannot now remember, is an avenue called "Buchanan's Walk," from the fact that the roof is so low that you have to carry the head a little to one side, as that venerable ex-President always did.

Not far from this is "The Altar," a number of columns of similar appearance, and connected by fame with a romantic story that here a young damsel was married, as she had previously promised (against her will) that she would never marry any man on the face of the earth!

Let me say a word about the streams of the cave. They connect by subterranean passages with Green River, and at times fish pass from Green River into the waters of the Mammoth Cave. On the other hand, the streams of the Mammoth Cave contain the eyeless fish and eyeless craw-fish, which do not exist elsewhere.

Whenever Green River is high, the waters of the cave sympathise with it, and communication beyond Echo River, on the "long route," is cut off at a certain height of the river.

I have failed to tell my readers much that I saw that was of great interest to us all, but if I have brought to their minds any adequate idea of the wonders of this cave, which probably in all its avenues extends at least eighty miles in various directions, I shall feel amply repaid.

THE CHEMIST AND DRUGGIST

COLONIAL BUILDINGS, 44A CANNON STREET, LONDON, E.C.
Published on the 15th of each Month.

Subscription, 10s. per year, payable in advance; commencing from any date.
Post free to every country in the world.
Single Copies, 1s. each.

A Copy of THE CHEMISTS' AND DRUGGISTS' DIARY, published annually, is presented to every subscriber. Price to non-subscribers, 3*s.*

Advertisements, Remittances, Subscriptions, Orders for Copies, and all communications must be addressed to "THE PUBLISHER OF THE CHEMIST AND DRUGGIST."

Cheques and Post-office Orders to be made payable to *Edward Halse* and crossed Martin & Co.

No one is authorised to collect money without production of the Proprietors' lithographed form of receipt.

Receipts not forwarded for subscriptions, nor for any sums under 10*s.*, unless the remittance be accompanied by a stamped envelope.

SCALE OF CHARGES FOR ADVERTISEMENTS.

One Page, 5*l.*; Half Page, 2*l.* 15*s.*; Quarter Page, 1*l.* 12*s.* Special Rates for Wrapper and the pages preceding and following literary matter. The above Scale of Charges will be subject to a discount of 10 per cent. upon six, and 20 per cent. upon Thirteen insertions. Seven lines and under, 4*s.* 6*d.*; every additional Line, 6*d.* Advertisements of Assistants Wanting Situations (not exceeding 12 words) inserted at a nominal charge of 1*s.* each.

All Advertisements intended for insertion in the current Month must be sent to the PUBLISHER OF THE CHEMIST AND DRUGGIST on or before the 12th, except Employers' and Assistants' Advertisements, which can be received up to 10 A.M. on the morning previous to publication.

Subscribers are requested to observe that the receipt of THE CHEMIST AND DRUGGIST in a *Green Wrapper* indicates that with that number the term of subscription has expired, and that no further number will be sent until the same has been renewed. We issue the notice very respectfully, not that we distrust our Subscribers, but simply because we find it impossible to keep an immense subscription list like that we now have, extending to almost every town in the world, in order, without an exact system like this.

Terms for Advertisements over the Leaders may be obtained on application to the Publisher.

Subscribers residing abroad can remit subscriptions, either by Post Office Order, or order on London houses. Or they may send the currency of their own country, according to the following tariff:—

Australasia	.. 10*s.*	India	.. 5 rupees.
Austria	.. 5 florins.	Italy..	.. 11½ lire specie.
Bavaria	.. 10 marks.	Japan	.. 2½ guldens.
Belgium	.. 12½ francs.	Java	.. 6 florins.
Brazil	.. 5 milreas.	Mauritius	.. 3 dollars.
Buenos Ayres	.. 2½ dollars.	Mexico	.. 2½ dollars.
Canada	.. 2½ dollars.	Norway	.. 2½ dols. specie.
Chili..	.. 2½ dollars.	Monte Video	.. 2½ dols. specie.
China	.. 2½ dollars.	Portugal	.. 2½ milreis.
Cuba..	.. 2½ dollars.	Prussia	.. 10 marks.
Demerara	.. 2½ dollars.	Russia	.. 3½ roubles.
Denmark	.. 4½ R. dollars.	South Africa	.. 10*s.*
France	.. 12½ francs.	Spain	.. 2½ dols. specie.
Germany	.. 10 marks.	Sweden	.. 2½ dols. specie.
Greece	.. 15 drachmæ.	Turkey	.. 50 piastres.
Hamburg	.. 8 marks ct.	United States	.. 2½ dollars.
Holland	.. 6 guldens.	West Indies	.. 10*s.*

DOMESTIC FILTRATION.

"WITH regard to the Silicated Carbon Filters, I have made many experiments upon them, and have been astonished at the energy and rapidity of their action. I passed through a small Filter of this make some of the worst description of water supplied by the London Water Companies, and found it, after filtration, to have become as pure as the very best London water. My experiments show that the Filter exercises a decomposing action—a chemical action—on the Organic impurities in Drinking Water. I have no doubt that water, which is dangerous from the Organic Matter contained in it, becomes *safe* on passing through the Silicated Carbon Filter. A point of some importance, shown by my experiments, is that a Second Filtration still further improves the quality of Drinking Water. After being in use for a considerable period, Filters lose their power and require renovation. I have found that the passage of a little Hot Water through the Silicated Carbon Filter, and afterwards blowing a little air through it, restores its power."

J. ALFRED WANKLYN, M.R.C.S., London,
Formerly Professor of Chemistry in the London Institution;
Joint Author of a Book on Water Analysis, and of the Ammonia Process.

RENDALL'S THEOBROMINE,
OR
CONCENTRATED COCOA.

BEING a first-class article, and nicely got up, commands a good sale by all Chemists who bring it under the notice of their customers.

In 1*s.*, 2*s.*, 3*s.* 9*d.*, and 7*s.* 6*d.* tins, through the Wholesale Houses, or direct from the Proprietor,

J. M. RENDALL,
28 QUEEN STREET, EXETER.
Chief Wholesale Agents—
SANGER & SONS, 150 OXFORD STREET, W.

POROUS BATTERY CELLS
OF SUPERIOR QUALITY.
PATENT PLUMBAGO CRUCIBLE COMPANY,
Sole Makers of Morgan's Patent Crucibles,
BATTERSEA WORKS, LONDON, S.W.

VICHY WATER COMPANY,
27 MARGARET STREET, REGENT STREET,
LONDON.
General Depôt for all Mineral Waters.

SURSUM CORDA.

A NEW YEAR, with its new-born hopes and fears, is on us, and we have gained a new reach in the great stream of Time. To-day is ours, and that its gift has been vouchsafed is in itself a proof that our happiness was intended to be increased. But there are those amongst us, respectable and conscientious, who would fain turn their eyes from the bright side of anything, as they would from beholding vanity: romance is bad in books and worse in action; "life is earnest, life is real,' and business is moreover business. Nevertheless, seeing how surely and with what swiftness responsibility brings in its train anxiety, and both assert their own, we would rather point out the silver lining than dwell upon the cloud; and of no truth are we more convinced than that where there are no day dreams there will be few waking realities. But high philosophy, wrapped in platitudes, never yet did any good; we believe that a cheerful frame of mind is an unmixed blessing: it is a bridge that will carry us over many an angry river, and an excellent remedy to that fretful and repining tone which is rather characteristic of our own fraternity.

Looking back, however, on the last twelve months there is one true reason for regret, and one that might doubtless be removed. We bring it boldly into notice, for the knowledge of our ill is half its cure. An undue proportion of our young men fail where they should shine the most, in their preliminary examinations. This failure is disheartening to themselves, and it augurs miserably, not so much for pharmacy as for the pharmacists of the future. Granted that strict attention to commercial interest, the virtue of perseverance, and trade aptitude, may alone secure a moderate competence, and possibly a suburban villa, such untrained recruits will scarcely uphold our national prestige. There is something wrong here—something which tempers a too rejoicing spirit—something that need have no existence. It seems (if figures are not false guides) that our sons, though at an age when the teens are beginning to be forgotten, cannot translate a page of Latin or arrange the composition of a few English sentences. Arithmetic is managed well, for which we are glad, as it may form an after study and be a constant source of pleasure; but it is a cheerless prospect to enter on an arduous career with just so much school learning as may serve to add up a bill. Business may be business, but it was not ordained to be labour on so intellectually barren a soil. We would appeal both to the generosity and the justice of the parent to save his children from so dire a separation from the enjoyments which a liberal education can bestow. We speak strongly on this matter, knowing the wonderful progress made throughout all classes in mental cultivation, and it is but reasonable to ask for the same advantages in our ranks as are not denied to the family of the humblest mechanic.

The modern student may indeed lift up his heart that his lot is cast in this later year of grace. We go no further back than the date of our respected grandsires to find material for thanksgiving that those times have changed, *et nos mutamur in illis.* We would not trench on the theme of pre-historic man, nor discuss the question whether there was a glacial epoch at the formation of the globe; but we would assert that at the dawn of the nineteenth century there was a glacial period in the formation of a man's intellect. Our immediate ancestors used to bewail in the roundest terms that the stick was no longer a legitimate instructor; and that Greek accidence had ceased to be associated with accidents of another kind. That was the age of a bombastic pharmacy, where puerile imaginings and oracular assertions stood in contrast with the simplicity of the teaching of the present day. The admirable system of instruction we all now enjoy in common is but the birth of yesterday; our books are incomparably better and cheaper, and our teachers at once more modest and infinitely superior to those of fifty years ago. Sursum corda! well may we lift up our hearts at the marvellous change effected.

But we are not all students, nor yet scholars, and if it be true that happy is that home where Martha is always allied with Mary, happy also is that business where trade industry and skill are associated with scientific training. These qualities united form the strongest elements of success. We may take this January to witness that never could we enter on the untried future under more cheerful auspices. Beyond controversy the tone of British Pharmacy is in a healthy state. Its followers permit themselves a wide range of thought, and manifest sustained endeavour towards the attainment of excellence in their art. They assume no claim which they have not striven to deserve. Our young men catch the inspiration. Those only dread examinations who have not reflected how the knowledge gained by honest study raises them immeasurably in the social scale, or how the power that thus has been acquired is capable of direct utilitarian use. We soon expect a removal of an evil which has vexed us sore—the grievance of late hours. The master, himself an educated individual, will be disposed to liberal views, and will reject protracted labour for its own sake as contrary to common sense. The assistant, on the other hand, for the same reason, will have a watchful care over his employer's interests, and will scorn to accept the boon of shortened work at the donor's loss. Far more important is the mutual relation between the employer and the employed than between the pharmacist and the medical profession; and if the assistant is to lift up his heart, let him try by his willing services so to lighten the load] that the master, with his rent and taxes, his family, and his unavoidable anxieties, may have the chance of following his example.

THE FUTURE.

If the Pharmacy Act is to accomplish any real commercial benefit for chemists and druggists as a body, that benefit must be extracted from it by themselves. The Legislature, in passing the Act, had no such benevolent object in view, and was simply desirous of ensuring greater security for the physic-taking section of the public. It would be directly contrary to the spirit of our modern government to grant anything like a monopoly in the sale of any articles of commerce; and if an exception has been made in favour of poisons, it is because public safety demands that the system of free trade, which is the accepted basis of commercial legislation in this country, shall be for this once over-ridden. This consideration should be borne in mind by those discontented pharmaceutists who abuse the Act because it has not prevented the grocer and the huckster from retailing Epsom salts and rhubarb pills. Protection to that extent is never likely to be obtained from an English Parliament, nor is it by any means desirable that such a policy should be inaugurated.

But Parliament has granted a very substantial benefit to chemists and druggists by granting to them the exclusive possession of the title or titles under which they can carry on the pharmaceutic business. The peculiarity of this favour is not, perhaps, sufficiently appreciated. Let it be remembered that no other class of tradesmen in England enjoys this definite privilege. Nor has any professional body the same advantage in such a complete manner as we possess it. It is true that no man may call himself a physician, surgeon, or apothecary without the necessary qualifications, but he may practise as a medical practitioner at his own good pleasure, and if it seems desirable to him he may, with very little trouble or expense, secure the noble title of "Doctor." A man may give legal advice to his heart's content, and take money for it if anybody will pay him. But a chemist and druggist he may not be without passing through the one necessary portal. Our cynical friends will of course object that the advantage thus demonstrated is but a shadowy and an unsubstantial one; but those who have discovered that a good name is, commercially, at least equal to riches, will not care for any elaborate proof of our position.

Assuming, then, that in this special property we have the basis of a real benefit, we wish to make clear to pharmaceutists how certain recent movements which have not been universally popular are, in our judgment, calculated to develop the value of that property. We refer to the new regulations which have lately and will henceforth govern the pharmaceutical examinations. Certain gentlemen with good opportunities of acquaintance with the subject have been telling young men in an apologetic sort of manner that the new examinations are not more severe than the old ones, but are only made somewhat more practical. We cannot tell what may be the precise ideas which these gentlemen associate in their minds with the terms "severe" and "practical," but results scarcely support these benevolent assertions. As a palpable fact, examinees have found the new test much *more* severe, and, as far as their practice has prepared them, much *less* practical than heretofore. The new examinations commenced last October; from then to December, inclusive, eighty-six candidates presented themselves for the Minor, of whom twenty-two passed. This low average will hardly be continued, but we think it may be fairly assumed that admissions into the trade will for some time to come figure much lower than in former years. Indeed, we hear on all hands that the prize is not worth the struggle, that young men are being driven from the trade, and that assistants are getting appreciably scarcer and dearer. With every expression of sympathy for the young men who are plucked and for the masters who are inconvenienced, we feel bound to add, having regard to the general interests of the trade, that we are glad to hear it. It is obvious that if the number of chemists in Great Britain were to-morrow reduced from 12,000 to 6,000, the value of the business to the survivors would be increased by precisely the extent of trade done by those which were gone. The number may never come down to the figure we have suggested; but we are confident that a very considerable reduction will be made, and it seems plain enough that we have entered on the period of transition. Of grown-up men, some forty per thousand may be expected to die annually; that gives us nearly five hundred vacancies per annum in our ranks made by death alone. Other causes, such as failures, emigrations, &c., increase this number, and it was shown by the Registrar's list of missing druggists which we published last month that members of this trade are curiously liable to get unaccountably lost. If there is an average of less than fifty, therefore, passing each Minor Examination, the members in the trade will gradually diminish by that difference.

Figures are hard, cold things, we know, and we would not insist on them too much; but it is worth while to take stock occasionally and know our exact position. We honour very highly those gentlemen in the provinces who are doing so much to help young men to pass the examinations; but some seem scarcely aware that in this they are acting generously. We must have a supply of new men, of course, or the whole business would collapse; but we think fair justice has hardly been meted out to those who have done something to stem the tide of new arrivals. The Pharmaceutical Society has in this matter incurred some undeserved unpopularity. In this matter the officials of that Society have done their duty towards the public and towards the trade also. It would have filled their coffers more abundantly to have passed all comers. The object has been, no doubt, the educational improvement of the body. We have endeavoured to point out how this harmonises with the commercial interests of the trade.

THE PROMISCUOUS KISSING OF CHILDREN, says the *Scientific American*, is a pestilent practice. We use the word advisedly, and it is mild for the occasion. Murderous would be the proper word, did the kissers know the mischief they do. Yes, madam, *murderous*; and we are speaking to you. Do you remember calling on your dear friend Mrs. Brown the other day, with a strip of flannel round your neck? And when little Flora came dancing into the room, didn't you pounce upon her demonstratively, call her a precious little pet, and kiss her? Then you serenely proceeded to describe the dreadful sore throat that kept you from prayer meeting the night before. You had no designs on the dear child's life, we know; nevertheless you killed her! Killed her as surely as if you had fed her with strychnine or arsenic. Your caresses were fatal. Two or three days after the little pet began to complain of a sore throat too. The symptoms grew rapidly alarming, and when the doctor came, the single word *diphtheria* sufficed to explain them all. To day a little mound in Greenwood is the sole memento of your visit. Of course the mother does not suspect, and would not dare to suspect, you of any instrumentality in her bereavement. She charges it to a mysterious Providence. The doctor says nothing to disturb the delusion; that would be impolitic, if not cruel: but to an outsider he is free to say that the child's death was due directly to your infernal stupidity. Those are precisely his words: more forcible than elegant, it is true; but who shall say, under the circumstances, that they are not justifiable? It would be hard to tell how much sickness and mortality from diphtheria is due to such want of thought. As a rule, adults have the disease in so mild a form that they mistake it for a simple cold; and as a cold is not contagious they think nothing of exposing others to their breath, or to the greater danger of labial contact. It would be absurd to charge the spread of diphtheria entirely to the practice of child kissing. There are other modes of propagation, though it is hard to conceive of any more directly suited to the spread of the infection or more general in its operation. It stands to diphtheria in about the same relation that promiscuous hand-shaking formerly did to the itch.

WHEAT STARCH.

MR. ABRAHAM, of Liverpool, recently presented to the Chemists' Association of that town some notes on the microscopic characters of the starch-powder generally supplied to chemists. Our Liverpool correspondent gives us the following notes of Mr. Abraham's remarks. He said that he had found some difficulty in obtaining wheat starch for pharmaceutical purposes. The Pharmacopœia defined "amylum" to be starch from the seeds of common *wheat*, but he found that what was commonly supplied in powder was wheat from *maize*. And though *chemically* wheat from all sources was the same, yet commercially they differed very much in value, and it was by no means certain that either dietetically or for other purposes they were equally good. He thought, therefore, that chemists should be on their guard, because the substitution of one for the other had been the subject of legal proceedings. In answer to a published inquiry, he had received several samples:—

1st.—From a house who believed they were supplying *wheat* starch. He found it to be a mixture of *potato* starch with *rice* starch.

2nd.—From Mr. Burrell, of Montrose, a specimen of wheat starch made by the Montrose Starch Company. It was genuine, but he could not say that it was suitable for dispensing purposes.

3rd.—From Messrs. Parry & Garnham, of the Borough High Street, who sent him a sample manufactured in the South of France, which he thought very good, and it was as described in the Pharmacopœia, "in columnar masses," but he thought pharmacists generally preferred it in powder.

4th.—From Messrs. Evans, Lescher & Evans he had obtained a supply of good wheat starch in powder.

Lastly, he had been favoured with a sample from Messrs. Sumner & Co., of Liverpool, which was also pure wheat starch.

He then exhibited, under various microscopes, the characteristics of the various starches.

THE ADULTERATION OF QUININE.

ALL our readers will recognise the necessity of preserving from the very breath of suspicion the fair fame of such an important medicine as quinine. We, therefore, request the attention, especially of foreign buyers, to the communication respecting this chemical which we publish in another column, over the signature of Messrs. Blagden & Angus, chemical brokers. The fraud described in their letter is a villainous crime, which it would have been worth some pains to have traced to its source. We notice another instance not less shameful, recorded in the *Medical Press and Circular*. One of the staff of that journal, we are told, some time ago, purchased a drachm of quinine at a respectable-looking chemist's shop in a large London thoroughfare. On putting a few grains into water it appeared slightly to effervesce, and his curiosity being thereby excited, an analysis was made, which revealed that this so-called quinine was a mixture of two parts of quinine with one of carbonate of soda. This adulteration is almost too clumsy to be accepted as genuine. The journal in which the report appears takes the opportunity of casting an insinuation against druggists generally, advising analysts to turn their attention to expensive drugs. It would have served a better purpose if the amateur analyst had followed up this particular case, and submitted it to a law court, so that we could have known all the circumstances. Hitherto the investigation of expensive and other drugs under the Adulteration Act has only proved the singular and general purity of the condition in which they are supplied.

THE WONDERS OF COMPOUND INTEREST.

The notions of this nineteenth century become more marvellous as we approach its final quarter, and it is dangerous to assert the impracticability of any scheme with such evidence as contemporary history presents. Channel tunnels and ocean penny telegrams are reasonable anticipations; but it may fairly be hoped that the circle will be squared, perpetual motion devised, and parallel lines made to meet, if the General Expenditure Assurance Company, Limited, successfully establishes the professed purpose of its formation, which is that of "assuring the return of all money expended from day to day." To eat our cake and have it too was the desire of our childhood, and though years of cruel disappointment have almost crushed out of recognition that innocent hope, we feel it revive within us in all its ancient vigour as we clutch the prospectus which promises to reveal to us, as Dr. Lynn would say, "how it's done." And the method, says the prospectus, "is very simple;" a remark with which we perfectly agree. It is to be worked thus: The company will agree with certain tradesmen of all sections, and these will give to every customer coupons for exactly the amount expended. For each five pounds' worth of these coupons the company will give the customer an assurance bond for that amount, "undertaking to pay its value at one of the half-yearly ballots," "*to you or your descendants*." Amid the general vagueness of this circular the candour of the clause we have italicised is worthy of observation. We presume the tradesmen who join this league are to pay to the company a certain commission out of their profits; the latter, after paying directors' fees, salaries, and office expenses, will invest the money thus received, and leave it to accumulate at compound interest. We can comprehend that if a vast *clientèle* can be secured a margin for investment may be spared; the tradesmen may, if they choose, perhaps pay 5 per cent. to the company without first of all charging it to the customer; but what puzzles us is to understand how a system of compound interest is compatible with a half-yearly division of profits?

SURGEON'S DISPENSING.

In another column we report a coroner's inquest held lately at Kingston, Surrey, at which a most extraordinary instance of reckless dispensing on the part of a surgeon's assistant was revealed. The woman whose death was the subject of the inquiry had been suffering from neuralgic pains in her side. The assistant to Mr. Shirtliff, surgeon, who was attending her, sent her a draught to be taken at bed time, and a liniment containing chloroform and aconite. It is not quite clear whether both were sent together; we presume not. But it was shown that they were sent in bottles almost similar in appearance, and it was admitted by the assistant himself that he had sent the liniment *without a label on the bottle!* We scarcely remember any case of such gross carelessness in any medical accident; and yet the only notice taken of it was that the coroner cautioned the assistant to put labels in future on bottles containing poisonous mixtures, and the jury returned a verdict of death by misadventure.

PERSIAN OPIUM.

A feature of the past year in connection with the opium market has been the improved position taken by Persian opium in the estimation of buyers here. It seems likely to become an important competitor with "Turkey seconds." The supply received during 1874, especially the North Persian growths, is said to be far in advance of what has come to hand previously. From some parcels a yield of morphia equal to fine Turkey has been obtained. A point in favour of the Persian is the fact that all the pieces in a parcel are invariably alike in quality. In "Turkey seconds" no two pieces are equal, and, therefore, it is next to impossible to get a correct assay of the drug from sample. Egyptian opium seems to have almost retired from the competition altogether, and it seems likely that the substitution of Persian for it will prove a considerable advantage to English buyers.

YERBA DEL PERRO.

Still another candidate for medicinal honours has arisen in Paris to follow Guarana, Jaborandi, Boldo, and the rest. M. Rabuteau lately presented to the Société de Biologie a specimen of a Mexican plant known as Yerba del Perro—dog plant—and an account of some experiments he had made with it on animals. It appears to be highly poisonous, producing effects somewhat analogous to strychnine. Its administration occasions wide dilatation of the pupils of the eyes, and, like Jaborandi, it excites an enormous flow of saliva. Its fatal effects seem to be exercised through the brain. It belongs to the order *Compositæ*.

THE SOUTH LONDON SCHOOL OF PHARMACY.

Annual Christmas Dinner.

At the Horns, Kennington, on December 18, a large and vivacious party of pharmaceutical students, with the teachers of the South London School and a few guests, sat down to a substantial Christmas dinner, under the presidency of their respected principal, Dr. Muter. Mr. Baxter, the secretary of the school, occupied the vice chair. After dinner a long programme of songs and speeches was gone through, nearly all of which met with an enthusiastic reception.

The chief toast, "Success to the South London School of Pharmacy," was proposed by Dr. Muter. In the course of a speech commenting on the subjects of pharmaceutical interest in reference to educational subjects, the speaker said that the examinations under the new regulations deserved the highest terms of praise, inasmuch as they were calculated to ensure that the best men, the most practically trained, got through. It was for giving students such practical training that the South London school existed. There was some talk of insisting on a curriculum of pharmaceutical education, and certain schools would have to be recognised. He (Dr. Muter) was quite satisfied that the South London school was by this time so well recognised that there was no danger of its being ignored. "The Successful Candidates" were proposed by Mr. Baxter, who stated that during the past session 268 candidates from that school had passed the Minor examination, and that every one who had gone up from them for the Major had passed. He coupled with this toast the name of Mr. Knight. Among the other toasts were "The Unsuccessful Candidates," "The Representative Press" (with which the Chemist and Druggist was coupled), "The Medical Profession" (Dr. Abbott Smith responding), and several others. The evening was heartily enjoyed by those who had the opportunity of attending.

THE CHEMICAL SOCIETY.

Thursday, November 19, 1874.

Professor Odling, F.R.S., President, in the Chair.

After the usual business of the Society, Dr. C. R. A. Wright read a Paper on the "Action of Organic Acids and their Anhydrides on the Natural Alkaloids," Part II., by himself and Mr. Beckett, being a continuation of that which he brought before the Society at the last meeting. Professor W. Ker Clifford then made a communication on "General Equations of Chemical Reactions," proving mathematically, from the Kinetic theory of gases, the generally adopted method for expressing chemical reactions. An interesting discussion ensued, after which the following Papers were read:—"On Propionic Coumarine and some of its Derivatives," by W. H. Perkin, F.R.S.; "On the Composition of Autunite," by Professor A. H. Church, and "The Action of Bromine on Protocalechuic Acid, Gallic Acid, and Tannin," by J. Stenhouse, F.R.S. The meeting was then adjourned.

Thursday, December 3, 1874.

Mr. W. H. Perkin, F.R.S., in the Chair.

After the usual business of the Society was terminated, a Paper was read by Mr. S. Lupton on "The Formulæ of the Alums;" the next was a note "On the Colour of Cupric Chloride," by M. W. N. Hartley, who finds the crystals of the salt, when quite dry, have a blue colour, and not a green, as they usually appear when slightly moist. Papers were also read "On the Oxidation of the Essential Oils," Part II., by Mr. C. T. Kingzett; "On the Purification and Boiling Point of Methylhexyl Carbinol," by Mr. E. Neison, and a "Note on the Boiling Point of Methylhexyl Carbinol," by Dr. C. Schorlemmer, F.R.S.

Thursday, December 17, 1874.

Professor Gladstone, F.R.S., Vice-President, in the chair.

After the usual business of the Society, a Paper on "Groves' Method of Preparing Chlorides," by Dr. Schorlemmer, F.R.S., was read. He finds that the process does not answer well for the higher primary alcohols, although secondary chlorides can readily be prepared by it. The other Papers were "On the Precipitation of Metals by Zinc," by Mr. J. L. Davies; "Researches on the Paraffins existing in Pennsylvanian Petroleum," by Mr. T. M. Morgan; "Some Remarks on the preceding Paper," by Dr. Schorlemmer; and "A Note on Aricine," by Mr. D. Howard, who finds that this is really a distinct alkaloid existing in certain kinds of reputed cinchona barks.

The Chairman announced that Professor C. Maxwell had promised to give a lecture on February 18, "On the Dynamical Evidence of the Molecular Constitution of Bodies." The meeting was then adjourned until Thursday, January 17.

ODOURS.

AMONG mineral substances, few solids, but quite a number of liquids and gases, are endowed with more or less powerful scents, in most cases not very pleasant ones, and usually characteristic. These odours belong to simple substances, such as chlorine, bromine, and iodine; to acids, as hydrochloric and hydrocyanic acid; to carburets of hydrogen, as those of petroleum; to alkaline substances, ammonia, for instance, &c. The odours observable among minerals may almost all be referred either to hydrocarbonic or hydrosulphuric gases, or to various solid and liquid acids produced by the decomposition of fats, or to peculiar principles secreted by glands, such as musk, ambergris, civet, and the like.

The odour of plants is due to principles very unequally distributed throughout their different organs; some solid, as resins and balsams, others which are liquid, and known by the name of essences or essential oils. In most cases the essence is concentrated in the flower, as occurs with the rose and the violet. In other plants, as in bent grass and Florence iris, only the root is fragrant. In cedar and sandal wood it is the wood that is so; in mint and patchouli, the leaves; in the Tonquin bean, the seed; in cinnamon, it is the bark which is the seat of the odorous principle. Some plants have several quite distinct fragrances. Thus the orange has three: that of the leaves and fruit, which gives the essence known by the name of *petit grain*; that of the flowers, which furnishes neroli; and again the rind of the fruit, from which essence of Portugal is extracted.

What, now, is the chemical nature of the odorous principles in plants? The chemistry of to-day reduces almost all of them to three categories of well ascertained substances: hydrocarburets, aldehydes, and ethers. We will endeavour to give a clear account of the constitution of these three kinds of substance, and to mark their place in the register of science. The hydrocarburets are simple combinations of carbon and hydrogen, as, for instance, the petroleum oils. They represent the simple compounds of organic chemistry. As to aldehydes and ethers, their composition is rather more complex; besides carbon and hydrogen, they contain oxygen. Every one knows what chemists mean by an alcohol; it is a definite combination of hydrogen, carbon, and oxygen, neither acid nor alkaline, which may be regarded as the result of the union of a hydrocarburet with the elements of water. Common alcohol, or spirits of wine, is the type of the most important series of alcohols, that of the monoatomic alcohols. Chemists represent it by the formula C_2H_6O, to indicate that a molecule of it arises from the union of two atoms of carbon with six atoms of hydrogen and one of oxygen. Independently of the alcohols, which are of great number and varying complexity, organic chemistry recognises another class of bodies, of which vinegar is the type, and which receive the name of organic acids, to mark their resemblance to mineral acids, such as oil of vitriol or aquafortis. Now, every alcohol, on losing a certain amount of hydrogen, gives rise to a new body, which is called an aldehyde; and every alcohol, on combining with an acid, produces what is called an ether. These rapid details allow us to understand precisely the chemical character of the essences or essential oils which plants elaborate within their delicate tissues. Except a small number among them which contain sulphur, as the essences of the family of crucifers, they all present the same qualitative composition—carbon and hydrogen, with or without oxygen. Between one and another of them merely the proportion of these three composing elements varies, by regular gradations, but so as always to correspond either to a hydrocarburet, or to an aldehyde, or to an ether. In this case, as in almost the whole of organic chemistry, everything is in the quantity of the composing elements. The quality is of so little importance to Nature that, while following always the same laws and constantly using the same materials, she can, by merely changing the ponderable relations of the latter, produce, by myriads of various combinations, myriads of substances which have no resemblance to each other. The strange powers of the elements and the mysterious forces concealed in matter make themselves known to us in a still more remarkable phenomenon, to which the name of *isomery* is given. Two bodies, thoroughly unlike as regards their properties, may present absolutely the same chemical composition with respect to quality and quantity of elements. "But in what do they differ?" it may be asked. They differ in the arrangement of their molecules. Coal and the diamond are identical in substance. Common phosphorus and amorphous phosphorus are one and the same in substance. Now, the odorous principles of plants offer some exceedingly curious cases of isomery. Thus the essence of turpentine, the essence of lemon, that of bergamot, of neroli, of juniper, of savin, of lavender, of cubebs, of pepper, and of gillyflower are isomeric bodies; that is, they all have the same chemical composition. Subjected to analysis, all these products yield identical substances in identical proportions; that is, for each molecule of essence, ten atoms of carbon and sixteen atoms of oxygen, as denoted by their common formula, $C^{10}O^{16}$. We see how these facts as to isomery prove that the qualities of bodies depend far more on the arrangement and the inner movements of their minute particles, never to be reached by our search, than on the nature of their matter itself; and they show, too, how far we still are from having penetrated to the first conditions of the action and forces of substances.

But chemistry has not stopped short with ascertaining the inmost composition of these substances; it has succeeded in reproducing quite a number of them artificially; and the compounds thus manufactured, wholly from elements, in laboratories, are absolutely identical with the products extracted from plants. The speculations of theory on the arrangements of atoms, sometimes condemned as useless, do not merely aid in giving us a clearer comprehension of natural laws, which is something of itself, but they do more, as real instances prove: they often give us the key to brilliant and valuable inventions. An Italian chemist, who was then employed in Paris, Piria, in 1838, was the first who imitated by art a natural aromatic principle. By means of reactions suggested by theory, he prepared a salicilic aldehyde, which turned out to be the essence of meadow-sweet, so delicate and subtle in its odour. A few years later, in 1843, Cahours discovered methyl-salicilic ether, and showed that it is identical with the essence of wintergreen. A year after, Wertheim composed essence of mustard, while believing himself to be making only allyl-sulphocyanic ether. These discoveries produce a sensation. Now-a-days the chemist possesses the means of creating many other natural essences. Common camphor, essence of bitter almonds, that of cummin and of cinnamon, which are aldehydes, as we have seen, may be prepared without camphor leaves or almonds, without cummin or cinnamon. Besides these ethers and aldehydes, whose identity with essences of vegetable origin has been proved, there exist, among the new bodies known to chemistry, a certain number of products formed by the union of common alcohol or amylic alcohol with different acids—that is to say, of ethers, which have aromatic odours more or less resembling those of some fruits, but as to which it cannot yet be affirmed that the odours are due to the same principles in both cases. However this may be, perfumers and confectioners, more industrious and wide-awake than chemists, have immediately made good use of many of these properties.

Artificial aromatic oils made their first appearance at the World's Fair of London in 1851. There was there exhibited a pear oil, diffusing a pleasant smell like that of a jargonel, and employed to give an aroma to *bonbons*. This product is nothing else than a solution of amylacetic ether in alcohol. Apple oil was exhibited beside the pear oil, having the fragrance of the best rennets, and produced by dissolving amylvaleric ether in alcohol. The commonest essence was that of pineapple, which is nothing else than ordinary butyric ether. There was observed, too, an essence of cognac, or grape oil, used to impart to poor brandies the highly prized aroma of cognac. The product which was then, and still is, the most important article of manufacture, is the essence of mirbane, which very closely resembles in its odour that of bitter almonds, and which commerce very often substitutes for the latter. Essence of mirbane is nothing else than nitrobenzine, which results from the action of nitric acid on benzine. Benzine, in turn, is met with among the products of distillation of tar, which also yield the substances used in preparing those beautiful colours called aniline.—*Scientific American*, from *Revue Scientifique*.

CHEMISTS AND CHRISTMAS.

A SPECIAL correspondent of the *Daily Telegraph* thus sketches the druggists' shops at the West End of town at Christmas time:—

Wending his way down the long and spacious Brompton Road towards Sloane Street, Knightsbridge, the observer can scarcely fail to be struck by the decidedly Christmas-like guise assumed during the last ten days by the stationers and the chemists and druggists—shops which, at the first blush, would not seem to have anything special to do with Christmas. After that festive season has terminated, one can readily understand how a considerable quantity of note paper and envelopes might be required for the purpose of penning replies of a reassuring nature to the tradesmen who, with their compliments and the expression of a hope for the continuance of past favours, have sent in their engaging little Christmas bills. After Christmas, a visit to the apothecary's with a view to getting Dr. Suavity's prescription for the young people—who have partaken of too much Christmas pie and pudding—made up, is readily comprehensible; but Christmas Eve is not yet come; and why should the stationery warehouses be crammed with customers? Why should broughams, with Maltese dogs peeping out from the windows, congregate before the pharmaceutist's doors? Why should the big bottles in their windows seem to glow with deeper crimson, livelier orange, and brighter cerulean hues? And why should their counters be furnished forth with piles of brilliant nicknacks? The truth is that the chemists have a great deal to do with the preparations for Christmas. The Socrates of the nineteenth century wants boxes of cough lozenges, tamarinds, black currant throat tablets, *jujubes*, *pâte de guimauve*, pepsine, bronchitis-cigarettes, soda-water syphons, Apollinaris water, Tidman's sea-salt, Lamplough's pyretic saline, chest protectors, dinner pills, respirators, and that celebrated specific for "next morning" headache, known as "the Twenty-fifth Hussars' Infallible Pick-me-up." The chemists sell all these things. Mrs. Xantippe wants Naples soap, glycerine, toilette bottles, scents, pumicestone, ivory-backed hairbrushes, macassar, kalydor, odonto, violet powder: to say nothing of divers subtle preparations for painting the face and dyeing the hair. All these vanities are dispensed by the druggists. There are charitable souls who distribute Liebig's extract of meat and Dr. De Jongh's light-brown cod-liver oil as Christmas gifts. You can get them at the chemist's; and hence the crowd of guests at Christmas in these establishments, which, together with their well-dressed and courteous assistants—there is nobody more civil than a chemist's "young man"—present a perpetual refutation of Shakespeare's libellous reference to the apothecary whom once he remembered, and the beggarly account of empty boxes among which that half-starved *medico* sate.

ARSENIC.

THE annual returns received at the Mining Record Office show that 5,449 tons of arsenic were produced in England in the year 1873. More than a third of it came from the Devon Great Consols Mine.

The Commissioners who have been for some years inquiring into the pollution of rivers state in their fifth report, recently issued, that at this mine the general drainage from the dressing-floors and the tanks in which the copper is precipitated was found, upon analysis of samples collected by them, to contain a very much larger proportion of arsenic than the maximum they would allow upon admission into any stream, no less, indeed, than 0·6 part in 100,000 parts of water, their suggested standard permitting only 0·05 part; but this drainage is not discharged directly into the Tamar, but is first mixed with a very large volume of water used upon the mine for power only. At this time, the mundic or arsenical pyrites is utilised for the manufacture of arsenious acid. It is roasted in a current of air, and thereby converted into marketable arsenious acid, or white arsenic; and of this, at the time of the Commissioners' visit of inspection, as much as 165 tons, sometimes 200 tons, were, as they were informed, being sold in a month. They regard it as a startling reflection that, even at the lower rate of sale, there would leave this single mine every month a quantity of white arsenic sufficient to destroy the lives of more than 500,000,000 of human beings.

The Commissioners saw stored in the warehouses of the mine, ready packed for sale, a quantity of white arsenic probably sufficient to destroy every living animal upon the face of the earth. They add, truly enough, that it is perhaps still more startling to reflect that there is at present no efficient law to prevent many fold this amount of this deadly material from being cast every month into the rivers and watercourses of this country; not, it is true, to expend its poisonous energy at once, for the mundic is insoluble in water, but, by its slow decomposition, to render rivers so treated poisonous and uninhabitable by fish for many generations.

The Commissioners consider that in the case of mines upon which arsenic is actually manufactured, it is only reasonable that (as is now the case with the retail sale of this article) the manufacture of a poison so virulent should be subject to special State supervision; and they submit that an officer should be empowered to require that the best practicable means be taken not only to prevent the poisoning of the air by the volatilisation of the arsenic, but also to hinder the access of the poison to running water. They are driven to this special recommendation because it is impossible to prevent altogether the occurrence of the poison in the effluent water of such mines, and there is no practicable method of removing it from water once contaminated so as to bring the proportion below the maximum named in their proposed table of standards of impurity which may be allowed in effluent mine water admitted into rivers and streams. A single officer would probably be able to inspect all such establishments in the United Kingdom.

Provincial Reports.

GLASGOW.

Chemists' and Druggists' Association.

The fourth scientific meeting was held in Anderson's University on December 23, Mr. W. Whyte, Vice-President, in the chair. The lecturer for the evening was Dr. John Dougall, who chose for his subject "Zymotic Poison."

The lecture was rendered most interesting by the exhibition of several flasks containing infusions of hay, urine, beef juice, &c., some undecomposed, others in different stages of fermentation in illustration of the subject. Dr. Dougall was listened to with the greatest attention, and frequently applauded. On the motion of Mr. Kinninmont, seconded by Mr. Fairlie, a hearty vote of thanks was awarded the lecturer at the close.

The early closing question having come up, a committee was appointed to investigate certain statements that were made regarding defaulters. A motion was also made to apply for a grant of money from the Pharmaceutical Society, but an amendment was carried to delay application till next year. Mr. A. Paul gave notice that at next meeting he would move "That ladies interested in the drug business be admitted as members of the Association," stating that he did so to put himself in order to propose that a lady chemist and druggist, who wished to become a member, might be admitted as such.

Dr. D. Campbell Black will deliver the next lecture, on January 20.

LEEDS.

The Chemists' Association.

On November 11, the annual social meeting was held, to which all the chemists in the town, as well as their assistants, were invited. About a hundred met together, and a pleasant evening was passed. In the course of a short address the President, Mr. Freshfield Reynolds, described the work which such an association as this should set before itself. "If we look around us," he said, "towards the horizon of the pharmaceutical world, what do we see there? 'A cloud no bigger than a man's hand!' For amongst the voices of the prophets we may hear in accents lower than a whisper, 'the curriculum of pharmaceutical education is coming.' And the mouth which utters the momentous announcement is none other than that of Mr. Giles, of Clifton, seconded, too, by our esteemed friend and neighbour, Siebold, of Manchester. Personally, I incline to the opinion that, taking the drug trade as a whole, and knowing that in country districts and the poorer districts of large town the remuneration to be obtained by a chemist and druggist is but very small, I say I incline to the opinion that it would not be advisable to inaugurate so extreme a measure as that advocated by the gentlemen named. However, whether the little cloud grows larger or fades altogether from our view, one thing is certain, scientific knowledge must be obtained somehow and somewhere, in order to pass the necessary examinations. Then I believe these local associations must become the centres for such educational means. Leeds already holds important advantages over her near neighbours—she is the capital of the great West Riding of Yorkshire—her School of Medicine ranks high in the esteem of the medical profession. The recently inaugurated Yorkshire College of Science has its home, as you know, in our midst. Why should not Leeds also become the centre of pharmaceutical education for Yorkshire? It is very likely that the college may materially assist towards such a settlement of the matter. Already it has its Professor of Chemistry, who delivers courses of lectures during the day, whilst our own able teacher, Mr. G. Ward, F.C.S., lectures to his students in the evenings. And although there will not probably be Professorships in Botany, Materia Medica, or Pharmacy, yet I believe the council would favourably receive any proposal from our Association for the establishing of Lectureships in such branches of science. Such lectures would doubtless have a certain prestige, and attract students to our town." The President also made a few remarks on the recent controversy on Professor Tyndall's address at Belfast: he thought the Professor had been rather hardly treated, considering his admission "that beneath all there is a power perfectly inscrutable to the intellect of man."

At the next meeting, on November 25, a Paper was read by Mr. Jas. Abbott, "On the Preservation of Syrups." Having described the mode of germination and the characteristics of the fungi which caused fermentation, he said it was false economy to use anything but the best sugar crystals in making syrups. They should be well boiled, put hot into clean small bottles, which should be filled to the lips, and the corks pushed in through the liquid; if stored in large bottles, the first time any was taken out our enemy fungus, spores, &c.—mould—entered and luxuriated even in darkness, light not being required for their development. It was admitted that dark-coloured or opaque syrup bottles were necessary in our shops to hide from view their dirty insides; midges, flies, mycelium, &c., being their constant occupants. He thought the old-fashioned teapot form of vessels for syrups was better than the modern bottle; you poured from the bottom without breaking through the crust of flies, mycelium, &c. (though of course they should not be there); and also that using from small bottles was better than from large ones.

At the fourth meeting, held December 9, Mr. E. Thompson in the chair, a circular was read from the Hull Chemists' Association, asking for co-operation and assistance in the defence of the "Morning Tonic" case. Action, however, was declined, on the ground that the information respecting the case was then insufficient.

Mr. Wm. Smeeton then read the Paper for the evening, entitled "A Beginner's Notions of Geology." The lecturer said that however correctly causes of geological phenomena might be pointed out, there was an infinity of space beyond leading upward to the primal cause of all. Such definitions as primary and secondary could only be relatively true. The rational way to understand the formation of the earth was to interpret the past by the present, on the assumption that the same forces have previously been in operation, and produced like results.

Mr. Smeeton confined his remarks to two of the destructive forces, namely, water as a chemical and mechanical agent, and water in the shape of ice. He showed how water acted chemically by dissolving lime rocks and salts, which was eventually conveyed to the sea, and mechanically by its wearing influence, as shown in every stream and river, and along every shore, so that constantly land and sea were changing places, both now and in ages past. The action of glaciers was illustrated by scratched boulder stones, and by diagrams showing that there was plenty of evidence that the northern half of Britain was, at some remote period, covered with ice as Greenland is at the present day. The lecture was illustrated with various fossils, both from the coal and limestone formations.

LIVERPOOL.

Chemists' and Druggists' Association.

Fifth general meeting held at the Royal Institution, December 17, 1874. The President, Mr. A. H. Mason, F.C.S., in the chair. After the formal business, Mr. Martin Murphy said that pitch had lately been rendered very scarce, in consequence of the great demand for anthracene causing distillers to use so much that the residue was useless for such purposes as road-making, coating roofs, &c. He had been informed that pitch from shale oil and petroleum oil had been tried as substitutes, but found unsuitable. Mr. Shaw called the attention of members to the fact that 27 chemists and druggists on the register in Liverpool could not be found at the addresses given. He asked any present who were acquainted with any of those persons to inform them of the necessity of sending their correct address.

Mr. W. E. Bickerdike, F.C.S., then read a Paper on "The Chemistry of the Tar Antiseptics."

A short discussion took place after the lecture, in which Messrs. Murphy, Davies, and others took part, and the meeting closed with a unanimous vote of thanks to the lecturer.

Poisonings.

An inquest was held on January 4 at St. Thomas's Hospital on the body of a Frenchwoman, named Celine Maran, who lived at a French hotel and restaurant, 35 Rathbone Place. The evidence showed that on Sunday, December 13, the deceased, suffering from diarrhœa, asked Julien Robart, a servant at the hotel with whom she lived, to fetch her some bismuth. He went to the shop carried on by the executor of the late Mr. Ungerer, chemist, Rathbone Place, and was supplied by the housekeeper with one or two teaspoonfuls of a white powder. The deceased said she knew how to take it, and she seems to have swallowed it all, except what was left on the side of the glass. Symptoms of poisoning soon manifested themselves. Dr. Francis Roupell, of 27 Charlotte Street, Fitzroy Square, was called in, milk was given, and other treatment adopted, but the poison had so seriously injured the poor woman that she died on the 28th of the month at St. Thomas's Hospital, whither she had been removed on Christmas Eve. Post-mortem and analytical evidence was adduced to show that corrosive sublimate had been taken, and the housekeeper, Winnifred Gant, who had served the powder, and who wished to be examined, gave evidence which confirmed this. The inquest was adjourned for a week to make further inquiries respecting the conduct of the shop. At the adjourned inquest Kitian Kubitz stated that he was a member of the Pharmaceutical Society of Great Britain. About three months ago he was engaged by the executor of Mr. Ungerer, chemist, to carry on his business at No. 18 Rathbone Place. Mrs. Gant, the housekeeper, did not serve in the shop beyond selling soaps and scents, and simple things of that kind. She never sold poisons. He was never there on Sundays, and was told by his employer that on Sundays no business was done at all, unless in cases of emergency. He did not know who did it. He was told that Mrs. Gant served this powder. If anyone came Mrs. Gant would attend to the bell, and send the person to Oxford Street, to another chemist there. A Juror: Did you prepare the bismuth that was in the bottle for retail sale?—No, it was old stock. Did you see a bottle labelled bismuth in the shop?—No. Did you ever sell any bismuth there?—No, I was never asked for it. And never made up a prescription with bismuth in it?—No. Then you did not do much business?—No. Did you ever see a bottle there labelled hyd: bi: chl:?—Yes. Is it corrosive sublimate?—I did not analyse it; it contained a whitish powder. Did you ever sell any of it?—No. The Coroner said the more he went into this case the more he was dissatisfied with it. He had received a letter from the Registrar of the Pharmaceutical Society stating that the officials of the Society wished to investigate this case. By the Act of Parliament no person was allowed to sell poisonous drugs unless he was registered under the Act of Parliament, and it was only by such cases as these coming to their knowledge that they could carry out their duties. He thought that this case should be further investigated, and should be adjourned for that purpose. The inquest was then further adjourned until the 18th inst.

On December 16 an inquest was held on the body of Mrs. Frobisher, the wife of a chemist and druggist, at Sedley Oak, Worcestershire. The deceased having sprinkled the bedclothes with chloroform, covered herself up, and expired in a few minutes. Verdict, temporary insanity.

On December 18 an inquest was held at St. Bartholomew's Hospital on the body of Agnes Gilfin, aged 23. The deceased had requested her mother to go into an adjoining room for some medicine which she had been in the habit of taking. When her mother returned with the bottle she took a dose and immediately became ill and vomited, though a stomach pump was used. She died in about fifteen minutes. An open verdict was returned.

A gardener, at Ditchingham Hall, near Bungay, Norfolk, who kept a secret bottle of liquor in a stable, has been fatally poisoned by taking up a bottle of embrocation instead of his own bottle and drinking a quantity of the poison.

An inquest was held at Reading, on the 4th inst., on the body of a young tradesman named W. J. White, of Shinfield. It appears that while in Reading he purchased of a chemist a packet of vermin killer, and mixing the powder with some whiskey, he took a draught and killed himself. Letters produced, which he had written previous to committing the rash act, showed that he had determined to poison himself in consequence of disappointed love. The jury, in giving their verdict, were divided in opinion; eight being of the opinion that he was temporarily insane, and the remainder that he was not.

An inquest was held at Norbiton, Surrey, on January 2, at which an extraordinary instance of careless dispensing was disclosed. We take the particulars from the *Surrey Comet*. The deceased was a Mrs. Sawyer, wife of Mr. Sawyer, who formerly kept the Barley Mow beer-house, Old Bridge Street.

Mary Ann Sawyer, daughter-in-law of deceased, said she was on a visit to her mother, at Burritt Road, Norbiton. Deceased was very ill, and had a draught to take and some liniment to apply outwardly. She gave her the draught last Sunday night, and they all went to bed at half-past 10. About half-past 12 she was aroused by deceased moving, and saw deceased with the bottle containing the liniment up to her mouth, drinking from it. Witness asked her what she was doing, and she said she had a pain in her side. Witness took the bottle from her, knowing it contained poisonous liniment. Deceased had drunk nearly all the liniment.

The bottles which had contained the medicine and liniment were produced; they were nearly alike in shape, but the liniment bottle bore the word poison on it in red letters. This label, however, the witness said, was not on the bottle when deceased drank the liniment; it had been put on since. She believed deceased drank it in mistake. Deceased died an hour after she had drunk the liniment, before any medical assistance could be obtained.

Mr. J. Hill Turner, assistant to Mr. Shirtliff, surgeon, deposed that he was called to deceased early on the 28th ult., and found her dead. He had treated her medically for intercostal neuralgia, and supplied her with liniment, the active ingredients in which were chloroform and aconite, both deadly poisons. The bottle contained 1½ oz. of liniment, and when deceased was dead he saw that it was empty.

The Coroner: Was the bottle when you saw it in the state it is now?

Witness: No, it had not got that label on. I had supplied some liniment of the same description before, and there was a label on that. I did not put a label on this bottle.

The Coroner: How do you account for that?

Witness: I expect it was an oversight. I put the label on afterwards.

The Coroner: Why did you put it on afterwards? It was rather foolish of you, and a great reflection might be thrown upon you for it.

Witness: I acknowledge it was so.

Mrs. Sawyer, recalled, said that deceased knew the liniment was poison, although she could not have read the label had there been one on it.

In reply to the Coroner, Mr. Turner stated that he believed the chloroform in the liniment was the cause of death.

The Coroner then cautioned Mr. Turner never to send out poisonous mixtures again without a label.

Joseph Sawyer, husband of deceased, also deposed that deceased knew the bottle contained poison; but he thought she took that bottle for the one containing medicine.

A verdict was returned of Death by Misadventure.

The Mercantile Directory of the World, published by Messrs. William Wilson & Son, of Talbot Court, Eastcheap, is an immense volume, containing over 3,000 quarto pages, and, according to the compiler, nearly three-quarters of a million names. It aims at giving a classified list of the merchants and traders of both hemispheres, though it is right to add that its editors do not profess to have made it complete. Such a scheme is far too vast for any one book, and we find in this the utmost inequality in regard to the extent of the information given in various countries, and, as far as we have been able to test it, a by no means invariable accuracy. The compilation, however imperfect though it must necessarily be, contains much information which cannot fail to be of use to the mercantile community.

RIMMEL'S VALENTINES.

The combination of perfumery with the mere stationery of former days in the production of valentines has given chemists and druggists a very legitimate opening for the introduction of that branch of business. And no stock of perfumed or other valentines can compare with those designed and manufactured in the establishment of Mr. Rimmel. We would especially recommend our readers who think of preparing for the famous Fourteenth to obtain Mr. Rimmel's list. At prices not by any means extravagant, the most elegant scented sachets are produced in valentine form, with the orthodox sentimental mottoes. Some have flowers beautifully painted on satin; many are adorned with sprigs of flowers suited for head-dresses, with brooches, smelling-bottles, and other devices. There are humorous valentines without any shade of coarseness which could not fail to please, and an immense variety to retail at all prices, from sixpence to ten guineas. The novelty for the year is "Cupid's Letter-Box," an excellent imitation of a pillar letter-box, from which on removing the top a pretty little Cupid, bearing his message, springs up *à la* Jack-in-the-box. This will be a very popular valentine. It is to sell at half-a-crown.

CHLORALYDE.

We have received a sample of a new medicine under the title quoted above, prepared by Dr. Barr Mitchell, and supplied to the trade by Messrs. Butler and Crispe. This is a very strong solution of chloral hydrate, containing, we are assured, half its weight of the substance, ten measured minims of the chloralyde representing five grains of chloral. The taste is well disguised, and the chief medicine is combined with other ingredients which give it to some extent the character of chlorodyne. The chloralyde is supplied as a patent medicine in the usual priced bottles.

BONNET'S PASTILLES FOR THE VOICE.

One of the sights of Paris is the Bourse for an hour or two after mid-day. If anyone wants to have an idea of the force which the French language is capable of he should pay a visit to this renowned den of the "Agents de Change." Several hundreds of them are there, screeching, yelling, shouting, bawling, and roaring, each with a vain desire to drown the voices of all competitors. How this method helps business it is difficult to see, and indeed it is whispered that the serious transactions take place more frequently in the evening, on the boulevards and in the cafés, than during the legitimate hours. However this may be, it is certain that the voices which are so violently exercised require frequent invigoration, and they get it, to a great extent, from M. Bonnet, who lives opposite, in the shape of his "Pastilles Agents de Change," as they are called. These pastilles are very enjoyable, and at the same time an excellent tonic for the throat. M. Bonnet has lately established a depôt in London, as announced among our advertisements, and his speciality ought to find a good many customers in our fog-bound isle. If our population rave less and even converse less than our neighbours of *outre-Manche*, we lecture and preach a good bit more, and therefore offer a good field for any really serviceable voice pastille.

EAU D'ANVERS.

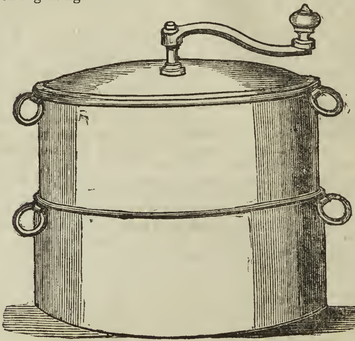
Without supposing that the reputation of Cologne water is in danger from the competition, we venture to believe that there is room enough in England for a considerable trade in the beautiful perfume manufactured by M. de Marbaix, of Antwerp, under the title of Eau d'Anvers. It is made in various strengths and supplied in bottles of two sizes. All the varieties except the strongest or "Royal" are cheaper than Eau de Cologne. The odour is different and its novelty will win for it popularity wherever introduced.

HARTIN'S CRIMSON SALT.

Among the disinfectants this well deserves to be known. It appears to be simply pure permanganate of potash put up to sell in sixpenny and shilling tubes. In this portable and economical form, the salt will frequently be found very convenient, while its well recognised value as a purifying and disinfecting agent need not be commented on here.

HANCOCK'S MIXING MACHINE.

Mr. Hancock, engineer, of Dudley, called at our office the other day with an apparatus similar to that represented in the annexed engraving.



He took it to pieces, and showed us that the inside contained merely a perforated diaphragm which was worked round by means of the winch as shown at the top. A non-moving iron cross was laid on the top of this diaphragm, and the drama began in earnest. Taking about half a pound of flour, and sprinkling over it, perhaps, half an ounce of powdered blue, this compound was pitched into the apparatus, and, after a few turns of the handle, came out a perfect mixture. We said the machine had some useful points about it, but if the powders were of different degrees of fineness the mixture would never be accomplished. Regardless of expense, Mr. Hancock at once sent out for a quarter of a pound of ground coffee, and mixed that with his flour. The machine combined these substances as easily as the others. After a few more experiments we fully admitted the utility of his machine, and said we would recommend it to the trade. It made an enormous noise, which, however, Mr. Hancock said he would rectify in future machines, but it mixed up the powders very quickly, and without any dust, and sifted them at the same time. There are numbers of services which such an apparatus can render to a chemist and druggist.

Before leaving us Mr. Hancock said he should send us, privately, a bread-making or bread-grinding machine, we forget which. We gently hinted that we were not open to bribery, but a little persuasion soon quieted us. So we looked for our Christmas-box, but it never came, and patiently we set to work to make bread again in the old manner for 1875, in the hope that we shall be able to keep pace with those half-dozen bread-grinding machines which adorn our suburban villa.

Correspondence

THE DERIVATION OF "CALOMEL."

TO THE EDITOR OF "THE CHEMIST AND DRUGGIST."

SIR,—The archæological questions propounded by your correspondent W. R. must be left to be answered by some one within reach of a good library.

I will, however, venture a guess at the etymology of the word "Calomel."

That the final syllable is derived from μέλας and refers either to the black colour produced when calomel is treated with a fixed alkali, to the medicine being good for purging "black" bile, or again to the fact (?) of the compound having been first made by a "black man," I do not believe.

The last reason strikes one at once as being absurd; the remaining two as at least far-fetched.

The striking peculiarity of calomel in the eyes of the older chemists was its mildness, or, as they termed it, its "sweetness," as compared with corrosive sublimate, of which it was supposed to be a mitigated variety. Hence the terms mercurius precipitatus *dulcis*, *manna* metallorum, *dulcified* mercury, *sweet* sublimate, and so on. Hence, also, unhappily, the excessive doses in which it was administered, even to children.

I beg leave, therefore, to suggest that μέλι (honey) is the parent of the last syllable. About καλὸς there can be no doubt.

The whole word means, I opine, the beautiful (white) substance that is (of course comparatively only) sweet as honey.

But if sweetness were intended to be signified, why not, you may say, have used γλυκύς. Because, I answer, the word so compounded would have been cacophonous, whereas calomel, on the contrary, is a word of pleasing sound, eminently euphonous.

Weymouth. T. B. G.

CHLORODYNE.

TO THE EDITOR OF "THE CHEMIST AND DRUGGIST."

SIR,—My attention has been called to an article that appeared in THE CHEMIST AND DRUGGIST of September 15 last, annexed to the portrait of Mr. J. T. Davenport, published with your journal of that date, which is calculated to mislead your readers by conveying the impression that Mr. Davenport is the sole proprietor of Chlorodyne.

I am the inventor of Chlorodyne, and, as such, I conferred upon Mr. Davenport the privilege of being the sole manufacturer of it, but I have never parted with my property in Chlorodyne to Mr. Davenport: he divides with me the profits from the manufacture and sale of that medicine so long as he may continue manufacturer of it, but he has no claim to any larger or other interest than that of partner with me in Chlorodyne.

By giving publicity to this correction in the next issue of your valuable journal, you will oblige

Yours faithfully,
J. COLLIS BROWNE, Phys., M.R.C.S.L.,
Late Army Medical Staff, &c.

4 Nelson Crescent, Ramsgate,
December 21, 1874.

AMERICAN PATENT MEDICINES.

TO THE EDITOR OF "THE CHEMIST AND DRUGGIST."

DEAR SIR,—You make a rather curious error in your statement of the sales of our pills in the very interesting letter in the December issue of your paper, and an equally curious omission. The error refers to the sale of Brandreth's pills, which are put down at 30,000*l.* We paid the U.S. Government last year $35,000 for stamps, each stamp one cent. We get $1,100 worth for $1,000, or say 10 per cent. discount, which is 3,850,000 single stamps, or single boxes of pills, as we only sell one size. The same quantity of stamps in this country would cost over 20,000*l.* sterling. So we must sell more than 30,000*l.* worth of pills. Allcock's plasters are omitted; last year we sold 35,000 gross. Hoping you will allow this correction,

I am, yours very truly,
H. D. BRANDRETH.

57 Great Charlotte Street, Liverpool,
December 30, 1874.

P.S.—We do a very large export trade of unstamped goods, which are not included in the above.

LEAD IN AËRATED WATERS.

TO THE EDITOR OF "THE CHEMIST AND DRUGGIST."

SIR,—Will you, through the medium of your columns, allow me to ask if any one can inform me if it is possible for lead to be held in suspension by carbonic acid gas?

With a view of preventing the contamination of my aërated waters, I removed the two lead pipes leading from gasometer and water tank to the pump of my (Barnett's) machine, and substituted stout elastic ones. Now those who understand the construction of these machines will know that the two remaining pipes, viz., the one from pump to condenser and from condenser to bottling tap, are block tin, and not likely to contaminate the solution passing through them with lead.

The only lead, therefore, left about the machine is the generator and the pipe leading from it to the gas-tub, but as the gas after leaving this lead pipe is washed in water and then stored in the gasometer, I felt that I at least was secure from any trouble on that score; however, upon analysis, I find I am no better off than my neighbours. Hence my query. Any information as to the means of obviating this difficulty will be thankfully received by LIQUOR PLUMBI.

P.S.—The recent explanation as to lead in citric acid will not apply to me, as I had soda water tested.

SPURIOUS SULPHATE OF QUININE.

TO THE EDITOR OF "THE CHEMIST AND DRUGGIST."

SIR,—Our attention has been called to a paragraph with the above heading in the *North China Herald* of October 8, and we consider that a reprint of the paragraph in your columns would be of great service as a warning to all who use sulphate of quinine.

The spurious article referred to is, we are afraid, much more frequently substituted for the true one than consumers have any idea of.

We recognise the article described as having been imported into Shanghai as identical in respect of labels, marks, &c., with a sample put into our hands a short time ago by a highly respectable house here.

This sample had been sent to our friends by one of their Indian correspondents with an order for a large quantity. We submitted the sample to Messrs. Howards & Sons, and it was found on examination not to be sulphate of quinine at all.

Of course our friends refused to execute the order, but there is little doubt that it was executed through another channel, and possibly in perfect good faith so far as the exporting house was concerned, although the price at which the article can be bought should arouse suspicion.

Those who profit most by this nefarious trade are doubtless the ultimate sellers—small native traders, as, on the other hand, the consumers are, in more ways than one, the sufferers.

The character of anything purporting to be sulphate of quinine can easily be ascertained by applying the test established by the British Pharmacopœia.

The best makers use distinctive labels bearing their names. This is a great safeguard, and leaves without excuse those houses who deal in the spurious article.

Yours, &c.,
BLAGDEN & ANGUS,
Chemical Brokers.

12 Philpot Lane, London, E.C.
December 20, 1874.

The following is the extract referred to in our correspondent's letter:—

We have been requested by Dr. Jamieson, Consulting Surgeon to the Customs, to publish the following note:—

On September 16 a package of 80 bottles of a white powder, purporting to be sulphate of quinine, was brought for examination to the Customs shed. It had been shipped by the steamer *Atalanta* from Hong Kong, and was being landed by a foreign firm for a native shop 廣信 in the Honan Road, between the Foochow and Canton Roads. The examiner, Mr. L. P. Möller, immediately recognised the spurious character of the drug, and attempted to stop its delivery. On reference to the Acting Commissioner, it was ascertained that the Customs had no power of seizure, but Mr. G. G. Lowder, recognising the importance of the case, impounded one bottle for my inspection. The value placed upon the "quinine" by the Chinese importer was 40 Mexican cents per ounce, or about one quarter of the cost at which genuine sulphate of quinine can be supplied wholesale by manufacturers.

As quinine is largely bought by private individuals, both native and foreign, and as its value when genuine can hardly be over-estimated in a climate such as this, it is of the utmost importance that inert or hurtful substances should not be allowed to take its place, to the sole advantage of unprincipled manufacturers and retailers. I trust, therefore, that not only will this note prevent foreigners from buying the article in question, but that it will be translated into the local Chinese prints, for the benefit of natives who are also large consumers of quinine, or of what they believe to be such. I may mention that the only quinine imported into Shanghai in which the least confidence can be placed is that manufactured by Howards & Sons, of Stratford.

The bottle submitted to me was an ordinary ounce quinine bottle, bearing a roughly executed label. At the upper part of the label is a scroll bearing the words "Produits Chimiques." Immediately beneath this is the facsimile of a medal bearing on the obverse a laurelled profile (left) of Napoleon III., with the legend "Napoleon III., Empereur," and on the reverse a female figure distributing garlands, with the legend "Société d'Encouragement." Beneath this, in a separate line, are the words "1 once," and beneath this again in two lines "Sulfate de Quinine, Paris." In the two bottom corners are two identical monograms of the letters S. Q., and surrounding each monogram a garter with the words "Fabrication de Sulfate de Quinine." On the red seal of the bottle before me the only legible letters are "—harmaceutiques." The manufacturer's name appears nowhere.

This morning (Sept. 29), with the able assistance of Mr. T. A. Coate, I made a careful analysis of the suspected drug in Messrs. Llewellyn & Co.'s laboratory. I need not enter into the details of the analysis; it suffices to say that the specimen does not contain the faintest trace of quinine, quinidia, cinchonia or cinchonidia. What it really is, is another question. It is not salicine or caffein, but it is a vegetable derivative of some kind yielding an incineration of 12 per cent. of a siliceous ash insoluble in aqua regia. It may be extremely poisonous, or, more probably, it is only inert. In either case intending purchasers are now warned.

I have left the bottle at the Medical Hall for inspection.

Obituary.

Bullock.—August 12, 1874, Mr. J. A. Bullock, chemist and druggist, of South Shields.

Fentiman. — December 26, 1874, Mr. George Fentiman, chemist and druggist, of Upper East Smithfield, London.

Lamotte.—December 9, 1874, Mr. Thomas Gallye Lamotte, chemist and druggist, of Exebridge, near Tiverton.

Mitchell.—December 15, 1874, Mr. Thomas Ellis Mitchell, chemist and druggist, of Gravesend.

Short.—December 11, 1874, Mr. Edward Ballard Short, chemist and druggist, of Bushey Heath, Herts.

Smith.—December 27, 1874, Mr. Richard Smith, chemist and druggist, of Bridgnorth.

Tye.—December 20, 1874, Mr. Charles Tye, chemist and druggist, of Stonehouse, Gloucestershire.

LEGAL & MAGISTERIAL.

THE LAST OF A WELL-KNOWN QUACK.

At the York Quarter Sessions, on the 4th inst., Ada Ridgeway, aged 10, and her grandfather, known as "Doctor Wilkinson, of No. 9 Lord Mayor Walk, York," but described as a chemist, and notorious as a quack doctor of the lowest type, were arraigned on a series of charges. Ridgeway was acquitted of stealing on account of an informality in the depositions; then she and her grandfather were arraigned, she on a charge of stealing a quantity of butter, and he for receiving it, knowing it to be stolen. The girl was acquitted, and Wilkinson was found guilty.

The Recorder, in passing sentence of 18 months' imprisonment upon him, said, if the prisoner had been a young man, instead of threescore and ten, he would certainly have given him penal servitude: the way in which he had treated the poor wretched little child merited the strongest censure.

The prisoner wept, and, repeatedly asserting his innocence, said he had religiously instructed the child, and prayed with her night and morning.

The Recorder said that such protestations on his part only convinced him more of the justice of the verdict at which the jury had arrived.

"GLORY FORM" AND BEER.

John Morley was brought before Mr. Arnold, and charged with being "drunk and incapable."

John, in defence, declared that some doctors had given him "Glory form."

Mr. Arnold asked him what on earth "glory form" was—was it anything good to drink?

The prisoner replied that he only smelt it, and it gave him a sensation. The doctor operated on him for bad eyes, and then he met some mates and had some beer.

Mr. Arnold said it was the beer and not the "glory form" which had made John "glorious," and fined him 2*s.* 6*d.* and costs.

LEAD AND LEMONADE.

At the Glasgow Police Court, on December 26, Margaret Carmichael, a lemonade manufacturer, was convicted of having sold lemonade that contained four-tenths of a grain of lead to the gallon, and was fined 3*l.* 3*s.*, with costs.

At the same place, on December 17, Andrew Stout was charged with having sold two bottles of lemonade adulterated with lead.

The defendant pleaded that he had done everything to avoid the possibility of such a thing; that he had erected a new receiver and lined all his pipes with block tin.

He was fined 5 guineas and 28*s.* 6*d.* costs.

PICKLES.

A batch of prosecutions under the Adulteration Act took place at Tunstall and Leek, in North Staffordshire.

Mr. C. Blade, chemist, was summoned for selling a bottle of pickles, which upon analysis was found to contain copper and sulphuric acid. As the pickles were manufactured by Messrs. Lazenby, of London, who guaranteed them as pure, the case was adjourned for a month, to allow the remaining portion to be analysed by some other analyst.

Mr. Morton, Mr. Bostock, and Messrs. Adams & Lamb, grocers, of Tunstall and Hanby, were also summoned under similar circumstances. All the cases were adjourned for a month.

MILK OF SULPHUR.

Mr. John Dixon, chemist, of Tunstall, was also charged with selling "precipitated sulphur," on November 23, which the analyst stated was adulterated with gypsum to the extent of 62 per cent., and injurious to health. He was fined 10*s.*

Mr. Joseph Keightley, chemist, of Tunstall, was also fined 10*s.* for a similar offence.

TERMS.—Announcements are inserted in this column at the rate of one halfpenny per word, on condition that name and address are added. Name and address to be paid for. Price in figures counts as one word.

If name and address are not included, one penny per word must be paid. A number will then be attached to the advertisement by the Publisher of the CHEMIST AND DRUGGIST, and all correspondence relating to it must be addressed to the "Publisher of the CHEMIST AND DRUGGIST, Colonial Buildings, Cannon Street, London, E.C.," the envelope to be endorsed also with the number. The publisher will transmit the correspondence to the advertiser, and with that his share in the transaction will ease.

FOR DISPOSAL.

28 lbs. gum opii turc., 33s. per lb.; 12 doz. Lord's crimson marking ink, 3s. to 6s. per doz. Harrop, Chemist, Oldham.

On sale. "CHEMIST AND DRUGGIST," half price, one week after issue. 9/12.

"Pharmaceutical Journal," posted day of arrival. What offers? Butterfield & Dunn, Shipley.

Twenty-five lbs. mercury, clean. What offers? Bell, Chesshire & Co., Chemists, East Brixton, S.W.

"Pharmaceutical Journal," 1873, well bound in half calf. How much for it? 12/33.

Opaque pomade bottles. Dental Forceps. Bell, Chesshire & Co., Druggists, Brixton, S.W.

Bell-metal mortar, in perfect condition—device, rose, thistle, and shamrock—weighs 35 lbs., diameter nine inches. What offers? Address, Dr. Lewis, Basingstoke.

Half a gross "Robbin's Condition Food for all Cattle," 1s. packets. Offers wanted? Address, J. N. Bentley, Heywood.

"CHEMIST AND DRUGGIST," 1865-66-68-69-70-72-73-74, 15s.; "Pharmaceutical Journals," 1873 and 1874, complete, 10s.; 1875, posted free on day of arrival, 10s. Lea, Folkestone.

Faraday's "Chemical Manipulation;" Fowne's "Chemistry," 9th edition; pair Dallmeyer's stereo single lenses; ditto Grubb's. W., Medical Hall, Gooch Street, Birmingham.

For sale or exchange, a good printing press, with type and materials complete in drawers and case. Specially arranged for a chemist. E. Orchard, Salisbury.

Homœopathic medicine case, Leath & Ross, advertised by them for 4l. 4s., for which 2l. 10s. will be taken; nearly new. Apply Done, Chemist, Coventry Road, Birmingham.

The "Pharmaceutical Journal" for 1874; also complete set of books for the Preliminary. What offers for either? Chemicus, 38 Corn Market, Derby.

56 lbs. pulv. zingib. jam, good colour and quality at 8d. per lb.; 2½ cwt. mel. ang. opt. at 11d.; 1,500 gross good phial corks, at 5d. per gross. Samples 2d.—stamps. W., 60 Silchester Road, Notting Hill, London, W.

Bentley's "Botany," nearly new, 7s. 6d.; "Pharmaceutical Latin Grammar," quite new, 3s.; Southall's Mat. Med. cabinet, good condition, 10s. 6d. E. Matcham, Cornhill, Ipswich.

Cheap for cash or credit, a second-hand soda-water machine, in good condition and working order, dial and water gauge, Brahma pump and rack. Will make about 200 dozen per day. For 25l. N. G. Wilcocks, Back Street, Bath.

The entire stock of fittings belonging to a chemist's shop will be sold, a bargain. Any reasonable offer for the whole will be accepted. Apply for list to W. F., 3 Belle Vue Road, Old Swindon, Wilts.

To Students. Microscope, 4 objectives, slides, &c., glass shade, and mahogany box, 30s. only; large chemical chest, replete with reagents and apparatus, 45s.; set of volumetric apparatus and stand, 15s. Bottomley, Apothecaries' Hall, Buxton.

The complete fittings, gold-labelled bottles, &c., of a first-class chemist's shop; handsome, substantial, and as good as new. Offers for the whole or separately. Descriptive list post free on application to M. B., care of Southall Bros. & Barclay, Birmingham.

Bentham's "British Flora," 1,295 original drawings, 2 vols., complete; last edition (1865), perfectly new and uncut. Price, 31s. 6d. (published at 3l. 10s.); Miller's "Chemistry," 3 vols., second edition, 25s.; 13 plumbago, &c., crucibles, 7s. 6d. A. Davis, 161 Seven Sisters' Road, London, N.

(Post free) Barber's "Pharmacopœia," 2s. 6d.; "Botanical Map," 1s. 2d.; Bidlake's "Grammar," 1s.; Cooke's "Botany," 9d.; Smith's "Guide," 3s. 9d.; Dr. Muter's "Chemistry," 10s. (quite new); Buckmaster's, 2s.; "Key," Shuttleworth's, 2s. 6d. Nemo, 4 Harbour Street, Folkestone.

Fowne's "Chemistry," 5s.; Buckmaster's "Inorganic Chemistry," 1s. 9d.; "Pharmaceutical Journal," 1842 to 1869, 16 vols. in 12, half calf; 13 vols. in cloth, 2l.; very elegant fan, new, beautifully carved ivory frame, 15s., cost 21s. All carriage paid. J. Donbavand, 360 Leeds Road, Bradford, Yorkshire.

Cheap. 4 doz. shop rounds, 28s.; 4 lb. citric acid, 10s.; 50 geological specimens, 5s.; pair dispensing scales, Maw's Fig. 7, 17s. 6d.; 8 2-lb. tins Du Barry's Revalenta, 30s.; 80 ¼-lb. packets Binyon & Robinson's tea, to retail 3s. 6d., at 2s. 6d.; 1 doz. 6d. and 1s. Day's Blacking, 10s.; 2 doz. 2s. Royal Indelible marking ink, 18s.; 1 doz. 1s. ditto, 4s. 6d. Chemist, 31 Spring Gardens, Buxton.

12 show carboys, 16, 8, 6, 4, 2-gallon, with stands; 4 pill machines, 2 and 5-grain, to cut 12, 24, 36 pills; 3 doz. 1s. boxes transparent glycerine soap, 6s. 6d. per dozen; 4 dozen 1s. and 2s. bottles McDougall's disinfecting fluid; 3 gals. Condy's red fluid; handsome dispensing screens and mahogany wall cases. For other goods, see Miscellaneous Column. Lloyd Rayner, 333 Kingsland Road, London, N. (late of 309 New North Road, Islington).

40 dozen 3d. Barber's vermin killer; 19 dozen 2d. ditto; 4 dozen 6d. ditto; 33 dozen 3d. phosphor paste; 3 dozen 6d. ditto; 12 dozen 1s. boxes French floating lights, tin; 30 dozen 1d. heart balsamic plasters; 60 dozen long ditto; 80 dozen sixpenny transparent cement (quality unsurpassed), nicely put up in boxes with label and price on; one dozen on lithograph show card. Offers for lot or one gross parcels. About 14 dozen yards elastic cotton web bandage, mostly three inches wide. Quite clean and new, but discoloured on the edge. Any reasonable offer. Goosey & Rogers, chemists, Stepney, E.

WANTED.

Sponge case, Maw's Fig. 74. Must be in good condition. Balch, Pharmaceutical Chemist, Ramsgate.

"CHEMIST AND DRUGGIST" for July, 1873. H. A. Moore, Chemist, Brierly Hill, Staffordshire.

2 dozen wide mouth stoppered shop bottles, 20 ozs. and 40 ozs. John Wearing, St. Just, Cornwall.

"CHEMIST AND DRUGGIST" and "Mineral Water Trade Review" a few day's old. State price. J. Ruston, M.P.S., Maryport.

Balfour's "Botany," Roscoe's "Chemistry," Strangeway's "Anatomy," last editions. State price, condition, &c. J. Donald, High Street, Wigton.

About 1½ dozen 2-inch wide mouth glass jars, with bell tops; also 8 or 10 6 inch to 8-inch ones; all plain. Send particulars and measurement to G. Briggs, Chemist, Goole.

Trade Memoranda.

Mr. Alderman Seaton, chemist and druggist, of Hull, has been appointed to the Commission of the Peace.

Messrs. Goundry & Co., the proprietors of the popular Consolidated Tea, are offering agencies to chemists. Their advertisement gives full particulars.

Mr. T. J. Hasselby, of Goole, has joined the firm of Walker & Atkinson, of Doncaster, and has disposed of his business at Goole to Mr. Joseph Rowntree, late of Howden.

The business of Messrs. Foster & Beedzler (late Dickinson), Queen's Gardens, Hyde Park, has been transferred to Messrs. J. & H. Matthews.

The executors of the late Mr. Sissmore, chemist, of Cranbrook, have handed the sum of 10*l.* to the secretary of the Benevolent Fund, being a legacy left by Mr. Sissmore.

One of the most severely injured in the terrible Shipton railway accident on Christmas Eve was Miss Thompson, housekeeper to a chemist in Jermyn Street, London.

A beautiful little specimen of elegant advertising is Messrs. Goodall, Backhouse & Co.'s neat and pretty little Almanac for 1875. The specialities of that enterprising firm are dilated upon in its pages in an attractive and curious manner.

Mr. F. Parsons, of Leicester, has taken into partnership Mr. S. H. Cadoux, who has resided with him as confidential assistant for some years. The business will in future be conducted under the title of Parsons & Cadoux.

Mr. Ayre, chemist and druggist, Gold Street, Northampton, has disposed of his business to Mr. Philadelphus Jeyes. This is the second business Mr. Jeyes has purchased within the past few months.

The business formerly carried on by Mr. Biggin, chemist, of Stamford, has undergone a transformation, and is now known as the Apothecaries' Hall and Wholesale Drug Company—G. W. Fenwick, manager.

A particularly agreeable dentifrice, or wash for the mouth, is Thresh's rose odontine. After use it leaves exactly the flavour of a rose lozenge. It is put up in bottles with sprinkler stoppers, and sold at a low price. The maker is Mr. Thresh, of Buxton.

A very stylish pharmacy has been opened at 132 Oxford Street by the General Apothecaries' Company, of Berners Street. The fittings are of Spanish mahogany throughout, relieved by ebonized mouldings, and the general effect is very tasteful and handsome. The work was accomplished, we are informed, by Messrs. W. Hawke & Son.

The *Ferdinande* and *Montserrat*, which arrived in the Mersey on the 24th ult., brought, with other cargo, 108 puncheons 64 hogsheads lime-fruit juice; 47 demijohns and 19 cases essence of lime fruit; and 10 tons quassia wood—the whole of the lime-fruit juice being for the sole consignees, Messrs. Evans, Sons & Co., Liverpool.

A peculiarly valuable page of hints on the storage of drugs, &c., is given by Messrs. Southall Brothers & Barclay, of Birmingham, in their January price current. Every retail druggist will learn something of practical service to him by taking note of these hints. We presume Messrs. Southall will send a copy to any chemist applying for one.

The chlorodyne and chlorodyne lozenges prepared by Mr. Twemlow, of Manchester, though sold at a very moderate price, seem to be excellent products. The proportion of active ingredients in the former is published, and the lozenges are well made, and are supplied in certain quantities with name of agent stamped on each.

The essence of beef and other dietetic preparations of Messrs. Brand & Co., of Mayfair, deserve all the reputation they have gained, and more also. Their essence of beef is a beautiful golden jelly, sold in tins, and of extreme value to invalids, as it can be taken by itself, and contains in a teaspoonful the nutritive properties of a large quantity of meat. Chicken and mutton broth are also made in the same concentrated form. Their concentrated beef-tea is a different preparation, being sold in solid form, and intended for solution. All are made from the finest qualities of meats.

GAZETTE.

BANKRUPT.

Appleby, Henry, 47 Mortimer Street, Cavendish Square, late Tottenham Court Road, and Pinner, chemist. Dec. 18.

LIQUIDATIONS.

(By arrangement or composition.)

Notices of first meetings have been issued in *re* the following estates. The dates are those of the petitions:—

Coulthard, Christopher, 168 High Street, Camden Town, chemist's assistant. Dec. 30.

Crossley, Thomas, Copperas House, near Todmorden, late Foundry Street, and Cheetham Hill Road, both Manchester, and Belfield, near Rochdale, chemical manufacturer and sizer. Dec. 31.

Dows, Gustavus Davis, and Clark, Adolphus, 47 Frith Street, Soho Square, soda-water machine manufacturers. Dec. 11.

Ede, John, Snowball Villa, Birchfield Road, Aston, Warwickshire, eye-liquid manufacturer. Dec. 11.

Ellis, Charles E., Thornbury, Gloucestershire, druggist, grocer and wine merchant. Dec. 8.

Kinsey, Samuel H., 44 Hugh Street, Pimlico, chemist. Dec. 16.

Thisleton, James Morris, Old Quebec Street, Portman Square, medical galvanist. Dec. 16.

Watkins, John, Barton Arcade, Manchester, chemist, late bank cashier. Dec. 8.

Weaver, Alfred, Eastwood, Notts, chemist. Jan. 1.

Wheeler, George, 207 Mare Street, Hackney, accouchement belt maker. Dec. 8.

Wightman, James Temple, Strand Street, Whitehaven, chemist. Dec. 15.

PARTNERSHIPS DISSOLVED.

Bailey & Co., North Walsham, chemists. Dec. 16.

Durant, Thomas & Son, King Square, Bristol, druggists' sundrymen. Sept. 29.

Edlin & Glencross, Bourn, Lincolnshire, surgeons. Aug. 10.

Jones & Evans, Ruthin, surgeons. Dec. 4.

Moore, G. & J. N., Moreton-in-Marsh, Gloucestershire, surgeons. Jan 1.

Moseley, Lewin & Sons, 30 Berners Street, and 448 Strand, London, and Hereford, dentists. Dec. 23.

Philbrick & Gill, College Road and Queen's Road, Brighton, general medical practitioners. Dec. 17.

Stovell & Scott, Chertsey, chemists and mineral water manufacturers. Nov. 17.

Taylor & Barrie, 41 Redcross Street, Southwark, fancy soap makers and perfumers. Dec. 5.

DIVIDENDS DECLARED.

Tesh, Samuel, and O'Neill, Arthur (Liq.), Sheffield, drysalters. Second and final div. 6*d.*; C. Corbidge, Norfolk Street, Sheffield.

TRADE REPORT.

The Board of Trade returns made up to December 31 show a grand total of exports during 1874 from the United Kingdom the declared value of which amounts to 239,436,207*l.* In 1873 the corresponding total was 255,164,603*l.*; and in 1872, 256,257,347*l.* The falling off is mainly in the iron and cotton, linen and woollen trades. The chemical trade shows an increase of exports both in regard to quantity and value. The following figures show the progress which has been made in this department of our national industry, adopting the classification of the Board of Trade.

	Quantities		
	Twelve Months ended December 31		
	1872	1873	1874
	Cwts.	Cwts.	Cwts.
Alkali:			
To Russia	264,019	314.268	344,311
Germany	672,089	828,354	814,674
Holland..	259,617	289,981	341,745
France	88,919	110,959	167,895
United States	2,189,824	2,149,331	2,092,947
Other Countries	978,595	1,061,532	1,249,425
Total	4,453,068	4,754,425	5,010,997

	Value		
	Twelve Months ended December 31		
	1872	1873	1874
ALKALI:	£	£	£
To Russia	176,911	238,382	226,724
Germany	329,348	421,921	341,853
Holland	103,911	121,916	134,743
France	44,897	61,589	74,535
United States	1,251,141	1,392,138	1,158,295
Other Countries	580,783	693,060	666,278
Total	2,486,991	2,929,006	2,602,428
CHEMICAL PRODUCTS, or Preparations, unenumerated	1,863,634	1,754,797	2,112,440

Thus it will be seen that notwithstanding the perpetual complaints which have been kept up by manufacturers throughout the year, the result comes out unexpectedly well. It must be borne in mind, however, that the average prices obtained have been considerably less than in previous years, and further, that a considerable amount of the exports of 1874 are sales by middle men, not by manufacturers. It may be assumed, however, that the accumulated stocks of speculators are by this time pretty well disposed of, not perhaps, as a rule, to the advantage of holders, and makers have the satisfaction of hoping that the new year opens with as clear a field as has ever been presented for their energy.

Business has opened for 1875 with a good tone, and there is a fair prospect of a good year. The President of the United States recommends the abolition of import duty on "chemicals used as dyes, compounded in medicines, and used in various ways in manufactures." There is little doubt that this suggestion will be carried out, as it harmonises with the report of the committee lately appointed by the American Government to inquire into the best means of improving at the same time the revenue and the general prosperity. This suggestion will probably have the effect of checking American orders until a conclusion is arrived at, but it must ultimately, if passed, tend to the improvement of British relations with the United States as far as the chemical trade is concerned.

The present condition of the chemical market does not show much change from last month. Bleaching powder is a little higher, and as there seems to be a sufficient demand for all that is produced it is said that manufacturers intend to secure a rather higher rate for as much as they have not made contracts for during the next six months. Citric acid is firm at 3*s.* 4*d.*, and experienced judges think that notwithstanding the recent abundant and excellent crop of lemons we are likely to see a recovery rather than a further depression in the quotations for this article. Makers of iodide of potassium have made a slight concession, in accordance with the market quotations for iodine, and the salt is now quoted at 9*s.* 8*d.* Abundant arrivals of mercury have caused the removal of 1*l.* per bottle from the stiff price the metal reached at the latter end of last year, which was exactly the figure we predicted for it when the price was first advanced.

In consequence of the Christmas holidays there were no drug sales for three weeks. They were resumed on the 7th inst., when an unusually large supply of produce was brought forward. The buyers were hardly equal to the occasion, and a large proportion of the stock was bought in. We noticed some Norwegian cod liver oil sell for 6*s.* 9*d.* to 7*s.* for pale new, while slightly tinged brought 6*s.* 3*d.* Newfoundland new sold at 5*s.* 6*d.* A tin of grey ambergris was bought in at the famine rate of 95*s.* Some bales of patchouli leaves were catalogued but withdrawn. Changes in staples generally were few and unimportant. The sales were continued on the 8th, and the same abundance of supply and slackness of demand still characterised the transactions.

The opium market has been dull, but the prospects are that the present high prices will continue, at least until something definite can be judged respecting the new crop. We quote the following remarks concerning this important drug from Mr. Albert Mann's annual circular. The indications, he says, "point to an improvement in the drug as the Spring advances. The principal thing to unfavourably influence the article would be the discovery of a larger stock in the interior of Turkey than is believed in by many: but as the estimates of the crop 1874 ranged between 1,600 and 2,500 cases, notwithstanding those who are best informed place it at the lower figure, yet we should be prepared for unexpected supplies turning up. The crop is, so far, well spoken of, but up to this time last year no damage had been reported; the plant, however, is so liable to accident that although sufficient is usually sown to produce 8,000 to 9,000 cases, only in 1871 was the lower figure secured, and it is extremely unlikely that the crop of that season will again be equalled, particularly as the famine now raging in Asia Minor has, doubtless, caused more attention to be paid to wheat. It is not till Easter that the growers are sufficiently influenced by the state of the crop, however favourable, unnecessarily to force their holdings off. There is, however, plenty of time for speculation and demand to again run up prices."

An advance of 2*s.* is to be noted in the price of oil of peppermint of "H. G. Hotchkiss's" brand. The new essence of lemon now arriving, as was to be anticipated from the reports respecting the exceptional quality of the fruit last harvest, is of high quality and moderate price. The stock of balsam of copaiba is very low here, and as the article is being manipulated by some speculators in New York, who control to some extent the export, we may see considerably advanced prices.

Respecting olive oil we have directly contradictory reports from two Italian ports. From Naples our advices are to the effect that the stormy weather in the Mediterranean has hindered shipments, and consequently occasioned such an accumulation of stock that persons are desirous of forcing sales for the sake of getting some ready money. Our Messina correspondent, however, writes:—"Prices unchanged but slightly easier; we have not reached the same low level as in Naples. Our transactions have so far been restricted to the Levant, whilst about thirty cargoes from the Neapolitan ports to England and the North of Europe are reported as sold. The spot is steady and rather unlikely to come down, since holders, having no further pressing engagements, show no eagerness to get rid of their holdings. They are strengthened in their opinion by the prevailing idea that next crop will not be abundant."

It should be added that the stock of olive oil is extremely low in London, being not more than one-fourth of that with which last year commenced, and also that the crop of Spanish oil is reported to be below an average. Linseed oil is firm. Turpentine is abundant, but the supply is likely to be more moderate than last year, when it was so free as to reduce the price to 23*s.* 6*d.* in September last.

Petroleum spirit, which has fluctuated in value during the past twelve months from 8½*d.* in June to 1*s.* 3*d.* in October, is now quoted at from 9½*d.* to 10*d.* The consumption in the United Kingdom during 1874 reached 52,788 barrels, against 44,432 in 1873, showing a constant progress in this marvellous trade. It is said that a few gas companies have lately been attempting the manufacture of gas from some of the lighter products, and that the results have been most satisfactory. Coal oil has become almost a defunct trade. A few works in Scotland and Wales continue to exist, supplying mostly a local consumption, and looking forward to the chances of advance in American petroleum, which might again enable them to compete.

In the circular of Mr. Ainis, of Messina, we are informed that speculators have seized on brimstone for their prey, and are demanding enormous rates for forward delivery, say January to June.

Monthly Price Current.

The prices quoted in the following list are those actually obtained in Mincing Lane for articles sold in bulk. Our Retail Subscribers must not expect to purchase at these market prices, but they may draw from them useful conclusions respecting the prices at which articles are offered by the Wholesale Firms.

CHEMICALS.

	1875.					1874.				
ACIDS—	s.	d.		s.	d.	s.	d.		s.	d.
Acetic ....per lb.	0	4	to	0	4½	0	4	to	0	0
Citric .... ,,	3	4	..	0	0	4	3	..	4	3½
Hydrochlor......per cwt.	5	0	..	7	0	4	0	..	7	0
Nitric ....per lb.	0	5	..	0	5½	0	5	..	0	5½
Oxalic .... ,,	0	6½	..	0	0	0	7½	..	0	0
Sulphuric ...... ,,	0	0¾	..	0	1	0	0¾	..	0	1
Tartaric crystal.. ,,	1	6¾	..	0	0	1	7	..	1	7½
powdered ,,	1	6¾	..	0	0	1	7	..	0	0
Antimony ore ......per ton	250	0	..	270	0	200	0	..	240	0
crude .. per cwt.	40	0	..	0	0	0	0	..	0	0
regulus .. ,,	0	0	..	0	0	0	0	..	0	0
star...... ,,	52	0	..	53	0	53	0	..	54	0
Arsenic, lump ...... ,,	0	0	..	0	0	20	6	..	0	0
powder.... ,,	0	0	..	0	0	10	0	..	0	0
Brimstone, rough ...per ton	150	0	..	160	0	127	6	..	145	0
roll .. per cwt.	10	0	..	10	6	9	6	..	10	0
flour.... ,,	11	6	..	12	6	11	6	..	12	6
Iodine, dry ....per oz.	0	8	..	0	0	1	1	..	0	0
Ivory Black, dry .. per cwt.	8	6	..	0	0	8	6	..	0	0
Magnesia, calcined..per lb.	1	6	..	0	0	1	6	..	0	0
Mercury ....per bottle	480	0	..	0	0	380	0	..	0	0
Minium, red ...... per cwt.	25	3	..	25	6	25	0	..	25	3
orange .. ,,	37	0	..	0	0	37	0	..	0	0
Precipitate, red . per lb.	7	3	..	0	0	6	2	..	0	0
white ,,	7	2	..	0	0	6	1	..	0	0
Prussian Blue .. ,,	0	0	..	0	0	0	0	..	0	0
SALTS—										
Alum ....per ton	165	0	..	170	0	175	0	..	185	0
powder...... ,,	185	0	..	0	0	190	0	..	0	0
Ammonia:										
Carbonate ...... per lb.	0	7	..	0	7¼	0	7½	..	0	7¾
Hydrochlorate, crude, white .... per ton	640	0	..	0	0	650	0	..	0	0
British (*see* Sal Am.)										
Sulphate........ per ton	360	0	..	370	0	350	0	..	360	0
Argol, Cape ......per cwt.	90	0	..	99	0	95	0	..	97	6
Red........ ,,	76	0	..	95	0	70	0	..	75	0
Oporto, red. ,,	32	0	..	33	0	32	0	..	32	6
Sicily ...... ,,	60	0	..	63	0	52	6	..	57	6
Ashes (*see* Potash and Soda)										
Bleaching powd...per cwt.	9	9	..	9	10½	10	6	..	10	9
Borax, crude...... ,,	40	0	..	60	0	45	0	..	70	0
British refnd. ,,	60	0	..	0	0	75	0	..	0	0
Calomel ....per lb.	6	9	..	0	0	5	9	..	0	0
Copper:										
Sulphate ....per cwt.	25	6	..	26	0	31	0	..	0	0
Copperas, green..per ton	65	0	..	70	0	60	0	..	62	6
Corrosive Sublimate p. lb.	6	0	..	0	0	5	0	..	0	0
Cr. Tartar, French, p. cwt.	112	0	..	0	0	111	0	..	0	0
brown ,,	90	0	..	95	0	95	0	..	101	6
Epsom Salts ....per cwt.	5	6	..	6	6	5	9	..	6	3
Glauber Salts .... ,,	6	6	..	7	0	4	6	..	5	6
Lime:										
Acetate, white, per cwt.	13	0	..	21	0	14	6	..	21	0
Magnesia: Carbonate ,,	42	6	..	45	0	42	6	..	45	0
Potash:										
Bichromate ....per lb.	0	6½	..	0	0	0	8½	..	0	0
Carbonate:										
Potashes, Canada, 1st sort ......per cwt.	36	0	..	36	6	35	6	..	0	0
Pearlashes, Canada, 1st sort ......per cwt.	40	0	..	40	6	47	0	..	0	0
Chlorate ......per lb.	0	10	..	0	10¼	1	1½	..	1	2
Prussiate .... ,,	1	2	..	1	3	1	2	..	0	0
red .... ,,	3	2	..	3	3	2	10	..	2	11
Tartrate (*see* Argol and Cream of Tartar)										
Potassium:										
Chloride......per cwt.	7	0	..	0	0	8	0	..	0	0
Iodide ....per lb.	9	8	..	0	0	18	0	..	0	0
Quinine:										
Sulphate, British, in bottles ......per oz.	7	0	..	0	0	8	6	..	8	9
Sulphate, French ,,	7	0	..	0	0	9	0	..	0	0
Sal Acetos ......per lb.	0	10	..	0	10½	0	11	..	0	0
Sal Ammoniac, Brit. cwt.	44	0	..	45	0	42	6	..	43	6
Saltpetre:										
Bengal, 6 per cent. or under ......per cwt.	21	0	..	21	9	23	9	..	24	6
Bengal, over 6 per cent. per cwt.	19	6	..	20	9	22	9	..	23	6
British. refined ,,	25	0	..	26	0	27	6	..	28	6
Soda: Bicarbonate, p. cwt.	15	6	..	0	0	18	0	..	0	0
Carbonate:										
Soda Ash ..per deg.	0	2⅜	..	0	0	0	2½	..	0	0
Soda Crystals per ton	100	0	..	102	6	115	0	..	120	0
Hyposulphite, per cwt.	0	0	..	0	0	15	6	..	16	0
Nitrate ......per cwt.	13	0	..	13	3	12	0	..	12	6
Sugar of Lead, White cwt.	42	0	..	44	0	47	0	..	48	0
Sugar of Lead, Brown, cwt.	38	0	..	39	0	33	0	..	34	0
Sulphur (*see* Brimstone)										
Verdigris .... per lb.	1	1	to	1	5	1	1½	to	1	6
Vermilion, English ,,	6	4	..	0	0	5	6	..	0	0
China ,,	5	6	..	5	7	5	6	..	5	7

DRUGS.

	1875.					1874.				
	s.	d.		s.	d.	s.	d.		s.	d.
Aloes, Hepatic ....per cwt.	60	0	..	180	0	80	0	..	200	0
Socotrine .. ,,	102	6	..	240	0	110	0	..	240	0
Cape, good.. ,,	36	0	..	39	0	30	0	..	40	0
Inferior..... ,,	29	0	..	35	0	20	0	..	30	0
Barbadoes .. ,,	50	0	..	187	6	75	0	..	200	0
Ambergris, grey........oz.	50	0	..	60	0	35	0	..	46	0
BALSAM—										
Canada............per lb.	1	10	..	2	0	2	8	..	0	0
Capivi .... ,,	2	7	..	2	10	2	8	..	0	0
Peru .... ,,	7	0	..	7	3	8	2	..	0	0
Tolu.............. ,,	4	0	..	4	1	2	4	..	2	5
BARKS—										
Canella alba......per cwt.	16	0	..	27	0	15	0	..	28	0
Cascarilla .... ,,	19	0	..	23	0	20	0	..	30	0
Peru, crown & grey per lb.	0	11	..	2	4	0	9	..	2	6
Calisaya, flat ,,	2	8	..	5	0	2	11	..	4	6
,, quill ,,	2	8	..	5	0	3	0	..	4	6
Carthagena ,,	0	6	..	1	11	0	9	..	2	0
E. I. .... ,,	1	0	..	4	6	1	0	..	5	0
Pitayo ...... ,,	0	4	..	2	0	0	6	..	2	2
Red .... ,,	1	0	..	3	6	1	7	..	6	0
Buchu Leaves........ ,,	0	2	..	1	0	0	1	..	0	9
Camphor, China ..per cwt.	70	0	..	72	6	90	0	..	0	0
Japan .. ,,	74	0	..	75	0	0	0	..	0	0
Refin. Eng. per lb.	1	1½	..	0	0	1	3	..	0	0
Cantharides........ ,,	3	0	..	5	0	5	3	..	6	0
Chamomile Flowers p. cwt.	35	0	..	50	0	20	0	..	66	0
Castoreum ....per lb.	6	0	..	24	0	4	0	..	20	0
Dragon's Blood, lp. p. cwt.	80	0	..	200	0	100	0	..	300	0
FRUITS AND SEEDS (*see also* Seeds *and* Spices).										
Anise, China Star per cwt.	115	0	..	117	6	150	0	..	155	0
Spanish, &c. ,,	15	0	..	28	0	29	0	..	35	0
Beans, Tonquin....per lb.	3	2	..	3	4	1	9	..	2	6
Cardamoms, Malabar good .... ,,	4	11	..	5	6	5	0	..	6	3
inferior.... ,,	2	0	..	4	10	3	6	..	4	11
Madras.... ,,	2	5	..	3	6	2	6	..	4	6
Ceylon .... ,,	4	0	..	5	6	4	0	..	4	11
Cassia Fistula....per cwt.	14	0	..	15	0	16	0	..	20	0
Castor Seeds .... ,,	7	0	..	11	6	5	0	..	10	0
Cocculus Indicus ,,	14	0	..	16	0	14	0	..	15	0
Colocynth, apple ..per lb.	0	10	..	0	11	0	4	..	0	10
Croton Seeds ....per cwt.	44	0	..	0	0	52	0	..	60	0
Cubebs.......... ,,	21	6	..	23	0	25	0	..	26	0
Cummin .... ,,	21	0	..	28	0	18	0	..	30	0
Dividivi .... ,,	11	0	..	15	0	11	0	..	15	0
Fenugreek ...... ,,	8	0	..	16	0	12	0	..	20	0
Guinea Grains .. ,,	25	0	..	0	0	26	0	..	30	0
Juniper Berries ,,	9	0	..	10	6	9	0	..	10	6
Nux Vomica.. .. ,,	7	6	..	13	0	8	0	..	12	0
Tamarinds, East India ,,	18	0	..	20	0	7	0	..	18	0
West India ,,	11	0	..	18	0	13	0	..	24	0
Vanilla, large .... per lb.	60	0	..	79	0	65	0	..	72	0
inferior ,,	50	0	..	59	0	29	0	..	64	6
Wormseed per cwt.	0	0	..	0	0	0	0	..	0	0
Ginger, Preserved, per lb.	0	6½	..	0	10	0	6½	..	0	9½
Honey Chili .... per cwt.	45	0	..	65	0	34	0	..	61	0
Jamaica ,,	48	0	..	58	6	42	0	..	50	0
Australian ,,	40	0	..	56	0	35	0	..	45	0
Ipecacuanha .... per lb.	3	5	..	3	10	3	3	..	3	7
Isinglass, Brazil.. ,,	2	10	..	5	7	3	3	..	5	1
Tongue sort ,,	3	0	..	5	8	3	6	..	5	5
East India ,,	1	0	..	5	6	2	3	..	4	9
West India ,,	5	0	..	5	7	4	9	..	5	2
Russ. long staple	8	6	..	13	0	8	6	..	12	6
,, inferior	4	0	..	8	0	4	0	..	8	0
,, Simovia	3	3	..	5	0	3	6	..	5	0
Jalap, good...... ,,	0	9	..	0	10	1	3	..	1	5
infer. & stems ,,	0	8	..	0	8¾	0	10	..	1	2
Lemon Juice .... per degree	0	2⅝	..	0	2¾	0	2¾	..	0	0
Lime Juice........per gall.	1	6	..	2	0	2	4	..	3	6
Liquorice, Spanish per cwt.	40	0	..	70	0	40	0	..	80	0
Liquorice Root ,,	11	0	..	16	0	11	0	..	18	0
Manna, flaky ......per lb.	2	6	..	3	0	2	6	..	3	3
small ...... ,,	1	2	..	1	5	1	4	..	1	9
Musk, Pod..........per oz.	20	0	..	45	0	20	0	..	41	0
Grain........ ,,	46	0	..	60	0	41	0	..	54	0
OILS (*see also separate list*)										
Almond, expressed per lb.	1	0	..	0	0	1	0	..	0	0
Castor, 1st pale.... ,,	0	4⅝	..	0	0	0	5¾	..	0	0
second .... ,,	0	4	..	0	4⅜	0	5	..	0	5½
infer. & dark ,,	0	3¾	..	0	0	0	4¾	..	0	4½
Cod Liver ...... per gall.	4	0	..	6	0	3	6	..	5	9
Croton .... per oz.	0	3	..	0	4	0	3	..	0	4
Essential Oils:										
Almond ....per lb.	22	0	..	0	0	25	0	..	0	0
Anise-seed ...... ,,	8	7½	..	0	0	10	0	..	0	0
Bay ....per cwt.	0	0	..	0	0	65	0	..	70	0
Bergamot ...... per lb.	10	0	..	25	0	15	0	..	18	0
Cajeput......per bottle	2	4	..	2	8	2	4	..	2	6
Caraway........per lb.	5	3	..	6	0	5	6	..	6	3
Cassia .... ,,	4	8	..	0	0	4	9	..	5	0
Cinnamon ......per oz.	1	0	..	8	0	1	0	..	5	0
Cinnamon-leaf .. ,,	0	0	..	0	3	0	3	..	0	3½
Citronelle ...... ,,	0	0	..	0	0	0	1⅞	..	0	0
Clove ....per lb.	10	6	..	0	0	9	6	..	0	0
Juniper .... ,,	1	10	..	2	0	1	3	..	2	4
Lavender ......per lb.	1	10	..	5	0	1	10	..	5	6
Lemon.......... ,,	7	0	..	11	6	11	0	..	15	0

	1875.		1874.	
Essential Oils, *continued*:—	s. d.	s. d.	s. d.	s. d.
Lemongrass ....per oz.	0 3¾ ..	0 0	0 2¾ ..	0 3
Neroli .... ,,	0 4 ..	3 0	0 4 ..	0 6
Nutmeg .... ,,	0 7¾ ..	0 8	0 8 ..	0 0
Orange..........per lb.	8 0 ..	12 0	8 0 ..	12 0
Otto of Roses....per oz.	15 0 ..	22 0	13 0 ..	22 0
Patchouli ...... ,,	2 9 ..	4 0	3 6 ..	4 0
Peppermint:				
American ....per lb.	22 0 ..	23 6	18 0 ..	19 0
English ...... ,,	29 9 ..	32 0	28 0 ..	34 0
Rosemary ...... ,,	1 4 ..	1 10	1 4 ..	1 10
Sassafras ...... ,,	2 0 ..	3 0	2 4 ..	3 6
Spearmint ...... ,,	6 0 ..	18 0	6 0 ..	19 0
Thyme.......... ,,	1 9 ..	2 0	2 0 ..	2 2
Mace, expressed ..per oz.	0 3 ..	0 3½	0 3 ..	0 3½
Opium, Turkey ......per lb.	38 0 ..	40 0	25 0 ..	29 0
inferior ...... ,,	20 0 ..	37 0	11 0 ..	24 0
Quassia (bitter wood) per ton	0 0 ..	0 0	70 0 ..	110 0
Rhubarb, China, good and fine ....per lb.	1 11 ..	5 9	3 0 ..	5 0
Good, mid. to ord. ,,	0 3 ..	1 6	0 6 ..	2 6
Dutch trimmed ,,	0 0 ..	0 0	0 0 ..	0 0
Russian .... ,,	0 0 ..	0 0	0 0 ..	0 0
Roots—Calumba..per cwt.	17 0 ..	23 0	9 0 ..	18 0
China .... ,,	18 0 ..	20 0	18 0 ..	24 0
Galangal.......... ,,	18 0 ..	22 0	20 0 ..	28 0
Gentian .... ,,	17 0 ..	19 0	17 0 ..	20 0
Hellebore .... ,,	30 0 ..	33 0	30 0 ..	33 0
Orris .... ,,	30 0 ..	70 0	36 0 ..	80 0
Pellitory.......... ,,	38 0 ..	39 0	38 0 ..	39 0
Pink ....per lb.	1 0 ..	1 3	1 0 ..	1 3
Rhatany.......... ,,	0 4 ..	1 8	0 6 ..	1 6
Seneka............ ,,	4 0 ..	4 10	4 6 ..	5 0
Snake .... ,,	1 0 ..	1 9	1 8 ..	1 9
Saffron, Spanish .. ,,	22 0 ..	26 0	20 0 ..	25 0
Salep ....per cwt.	170 0 ..	200 0	170 0 ..	200 0
Sarsaparilla, Lima per lb.	0 5¼ ..	0 9	0 6 ..	0 9
Para.............. ,,	1 0 ..	1 3	1 0 ..	1 3
Honduras .... ,,	1 6 ..	2 0	1 1 ..	1 7
Jamaica .... ,,	1 9 ..	2 6	1 6 ..	2 3
Sassafras ....per cwt.	13 0 ..	14 0	14 0 ..	17 0
Scammony, Virgin ..per lb.	25 0 ..	36 0	25 0 ..	30 0
second & ordinary ,,	7 0 ..	24 0	8 0 ..	24 0
Senna, Bombay .... ,,	0 1 ..	0 5	0 1 ..	0 5
Tinnivelly .... ,,	0 1½ ..	0 9	0 2 ..	1 0
Alexandria........ ,,	0 3¼ ..	1 5	0 4 ..	1 10
Spermaceti, refined ,,	1 2 ..	1 3	1 6 ..	0 0
American .... ,,	1 0 ..	1 1	1 2 ..	0 0
Squills .... ,,	0 1¾ ..	0 3¾	0 1 ..	0 2
GUMS.	£ s.	£ s.	£ s.	£ s.
Ammoniaci drop .. per cwt.	4 15 ..	6 0	3 0 ..	3 10
lump.. ,,	3 10 ..	4 10	2 10 ..	3 0
Animi, fine washed ,,	13 10 ..	15 10	11 0 ..	13 10
bold scraped ,,	10 15 ..	13 7/6	9 0 ..	11 0
sorts ...... ,,	6 10 ..	10 10	5 0 ..	10 0
dark ...... ,,	5 10 ..	6 0	4 0 ..	4 15
Arabic, E.I., fine pale picked .. ,,	2 18 ..	3 10	3 0 ..	3 17
srts.,md.tofin. ,,	1 16 ..	2 16	2 0 ..	2 18
garblings .. ,,	0 19 ..	1 10	1 0 ..	2 6
Turkey, pick.gd.to fin. ,,	7 0 ..	11 0	7 10 ..	11 10
second & inf. ,,	3 0 ..	6 18	4 0 ..	7 0
in sorts .. ,,	1 18 ..	2 15	2 10 ..	3 15
Gedda .... ,,	1 0 ..	1 8	1 1 ..	1 15
Barbary, white .. ,,	0 0 ..	0 0	1 10 ..	2 5
brown .. ,,	1 6 ..	1 12	1 6 ..	2 0
Australian...... ,,	1 4 ..	2 8	1 8 ..	2 8
Assafœtida, cm. to fin ,,	0 9 ..	2 4	2 15 ..	3 10
Benjamin, 1st & 2nd ,,	12 0 ..	22 0	9 0 ..	24 0
Sumatra 1st & 2nd ,,	7 10 ..	12 0	7 5 ..	9 0
3rd	2 7/6 ..	4 7/6	3 10 ..	4 5
Copal, Angola red ,,	5 10 ..	5 15	5 15 ..	6 5
Benguela ,,	3 15 ..	4 10	5 10 ..	5 15
	s. d.	s. d.	s. d.	s. d.
Sierra Leone, per lb.	0 4½ ..	0 10½	0 3 ..	0 10
Manilla....per cwt.	20 0 ..	27 0	14 0 ..	26 0
Dammar, pale .... ,,	0 0 ..	0 0	40 0 ..	41 0
Singapore .... ,,	50 0 ..	54 0	40 0 ..	45 0
Euphorbium .... ,,	11 0 ..	15 0	11 0 ..	15 0
Galbanum .... per lb.	1 6 ..	2 0	1 6 ..	2 0
Gamboge, pckd. pipe per cwt.	180 0 ..	280 0	220 0 ..	320 0
Guaiacum ....per lb.	0 8 ..	2 6	0 6 ..	2 6
Kino..............per cwt.	60 0 ..	90 0	50 0 ..	80 0
Kowrie, rough .. ,,	16 0 ..	46 0	22 0 ..	35 0
scraped sorts ,,	47 0 ..	53 0	36 0 ..	52 6
Mastic, picked ....per lb.	4 6 ..	6 0	5 0 ..	6 6
Myrrh, gd. & fine per cwt.	119 0 ..	280 0	120 0 ..	240 0
ord. to fair.... ,,	75 0 ..	115 0	80 0 ..	110 0
Olibanum, p. drop ,,	60 0 ..	65 0	70 0 ..	75 0
amber & ylw. ,,	53 0 ..	59 0	60 0 ..	68 0
garblings.... ,,	20 0 ..	39 0	20 0 ..	40 0
Senegal .... ,,	2 0 ..	2 15	3 0 ..	4 0
Sandarac .... ,,	90 0 ..	97 0	70 0 ..	105 0
Shellac, Orange.. ,,	275 0 ..	290 0	202 6 ..	220 0
Liver .. ,,	250 0 ..	280 0	195 0 ..	200 0
Thus .... ,,	21 0 ..	23 0	19 0 ..	30 0
Tragacanth, leaf ,,	220 0 ..	390 0	200 0 ..	400 0
in sorts ,,	30 0 ..	190 0	30 0 ..	150 0
OILS.	£ s.	£ s.	£ s.	£ s.
Seal, pale ....per tun	35 0 ..	0 0	34 10 ..	0 0
yellow to tinged ,,	32 0 ..	34 0	31 10 ..	34 10
brown ...... ,,	28 0 ..	29 0	30 0 ..	31 0
Sperm............ ,,	103 0 ..	0 0	0 0 ..	0 0
Cod .... ,,	40 10 ..	41 0	33 10 ..	34 0

	1875.		1874.	
Oils, *continued*:—	£ s.	£ s.	£ s.	£ s.
Whale, South Sea, pale, per tun	36 0 to	0 0	33 10 to	0 0
yellow ,,	28 10 ..	35 0	32 0 ..	33 0
brown ,,	26 0 ..	28 0	30 0 ..	31 0
East India, Fish ,,	23 0 ..	0 0	26 0 ..	0 0
Olive, Galipoli ....per ton	0 0 ..	0 0	48 0 ..	0 0
Trieste...... ,,	42 10 ..	43 0	46 0 ..	0 0
Levant .... ,,	41 0 ..	0 0	42 0 ..	42 10
Mogador .... ,,	40 5 ..	0 0	41 10 ..	42 0
Spanish .... ,,	0 0 ..	0 0	43 10 ..	44 0
Sicily ...... ,,	42 10 ..	0 0	43 0 ..	43 10
Cocoanut, Cochin.. ,,	43 10 ..	44 0	36 0 ..	40 0
Ceylon ,,	37 15 ..	38 0	33 10 ..	36 0
Sydney ,,	37 0 ..	37 10	31 0 ..	35 0
Ground Nut and Gingelly:				
Bombay	0 0 ..	0 0	0 0 ..	0 0
Madras	35 0 ..	0 0	36 0 ..	0 0
Palm, fine..............	35 0 ..	35 10	36 0 ..	36 10
Linseed	26 0 ..	0 0	21 12/6 ..	0 0
Rapeseed, English, pale ..	32 5 ..	0 0	35 0 ..	0 0
brown	30 5 ..	0 0	33 0 ..	0 0
Foreign, pale ..	32 10 ..	0 0	35 10 ..	0 0
brown	0 0 ..	0 0	0 0 ..	0 0
Cottonseed	24 10 ..	0 0	27 0 ..	0 0
Lard	70 0 ..	0 0	43 0 ..	0 0
Tallow	22 0 ..	28 0	29 0 ..	0 0
Turpentine, American, cks.	26 6 ..	27 0	31 0 ..	31 3
French ,,	0 0 ..	0 0	0 0 ..	0 0
Petroleum, Crude	0 0 ..	0 0	0 0 ..	0 0
	s. d.	s. d.	s. d.	s. d.
refined, per gall.	0 9½ ..	0 9⅞	1 0½ ..	0 0
Spirit ,,	0 10 ..	0 0	0 11 ..	0 11½
SEEDS.				
Canary............per qr.	160 0 ..	0 0	60 0 ..	68 0
Caraway, English per cwt.	0 0 ..	0 0	39 0 ..	44 0
German, &c....	18 0 ..	29 0	26 0 ..	36 0
Coriander	8 0 ..	18 0	8 0 ..	16 0
Hemp..............per qr.	0 0 ..	0 0	40 0 ..	44 0
Linseed, English per qr. ..	56 0 ..	57 0	58 0 ..	61 0
Black Sea & Azof	55 0 ..	56 0	58 0 ..	59 0
Calcutta ,,	59 0 ..	60 0	62 0 ..	0 0
Bombay ,,	60 0 ..	61 0	63 0 ..	0 0
St. Petrsbrg. ,,	54 0 ..	56 0	56 0 ..	59 0
Mustard, brown..per bshl.	0 0 ..	0 0	10 6 ..	15 6
white.. ,,	8 0 ..	12 0	8 10 ..	11 0
Poppy, East India, per qr.	52 0 ..	0 0	65 6 ..	66 0
SPICES.				
Cassia Lignea ..per cwt.	57 0 ..	75 0	70 0 ..	82 0
Vera .... ,,	24 0 ..	50 0	30 0 ..	61 0
Buds .... ,,	120 0 ..	122 6	115 0 ..	117 6
Cinnamon, Ceylon:				
1st quality ......per lb.	2 9 ..	4 3	2 0 ..	4 3
2nd do. .... ,,	2 0 ..	3 3	1 8 ..	3 5
3rd do. .... ,,	1 8 ..	2 10	1 6 ..	3 0
Tellicherry ...... ,,	3 0 ..	3 5	0 0 ..	0 0
Cloves, Penang .... ,,	2 2 ..	2 2½	0 11 ..	1 0
Amboyna .... ,,	1 7½ ..	1 8½	1 5 ..	0 0
Zanzibar.......... ,,	1 4¾ ..	1 5½	1 5 ..	0 0
Ginger, Jam., fine per cwt.	105 0 ..	200 0	110 0 ..	250 0
Ord. to good .... ,,	75 0 ..	100 0	66 0 ..	100 0
African .... ,,	58 0 ..	0 0	60 0 ..	0 0
Bengal............ ,,	48 0 ..	55 0	53 0 ..	0 0
Malabar .... ,,	50 0 ..	0 0	50 0 ..	0 0
Cochin .... ,,	79 0 ..	127 6	70 0 ..	120 0
Pepper, Blk, Malabar, per lb.	0 6⅝ ..	0 7½	0 8 ..	0 8¼
Singapore .... ,,	0 6⅛ ..	0 0	0 7⅜ ..	0 0
White Tellicherry ,,	0 11 ..	1 6	2 0 ..	0 0
Cayenne .... ,,	1 6 ..	3 1	1 6 ..	2 1
Mace, 1st quality .. ,,	3 0 ..	3 7	3 6 ..	4 0
2nd and inferior .. ,,	1 7 ..	2 11	2 11 ..	3 5
Nutmegs, 78 to 60 to lb.	3 3 ..	4 4	3 4 ..	4 7
90 to 80 ,,	2 9 ..	3 6	3 1 ..	3 3
132 to 95 ,,	2 11 ..	3 3	2 6 ..	3 0
Pimenta	0 3 ..	0 3½	0 2¾ ..	0 3
VARIOUS PRODUCTS.				
COCHINEAL—				
Honduras, black ..per lb.	2 0 ..	2 10	2 1 ..	3 0
,, silver .. ,,	1 11 ..	2 3	1 11 ..	2 4
,, pasty .. ,,	1 9 ..	1 10	1 8 ..	1 10
Mexican, black.... ,,	1 9 ..	2 1	2 1 ..	2 5
,, silver.... ,,	1 8 ..	1 9	1 11 ..	2 0
Teneriffe, black .. ,,	2 0 ..	3 8	2 1 ..	3 10
,, silver .. ,,	1 9½ ..	2 1	2 0 ..	2 3
SOAP, Castile......per cwt.	33 0 ..	34 0	33 0 ..	34 0
SPONGE, Turk. fin. pkd pr lb.	12 0 ..	16 0	12 0 ..	16 0
Fair to good ,,	4 0 ..	11 0	4 0 ..	11 0
Ordinary .. ,,	1 0 ..	3 6	1 0 ..	3 6
Bahama .... ,,	0 6 ..	3 6	0 6 ..	3 6
TERRA JAPONICA—				
Gambier ......per cwt.	26 3 ..	26 6	24 0 ..	24 3
Free cubes .... ,,	40 0 ..	44 0	34 0 ..	36 0
Cutch .... ,,	28 6 ..	30 0	20 0 ..	20 6
WOOD, Dye, Bar ..per ton	£5 5 ..	£0 0	£3 7/6 ..	£3 10
Brazil, Branch .... ,,	18 0 ..	27 0	24 0 ..	30 0
,, Logs ...... ,,	9 0 ..	16 0	9 0 ..	20 0
Cam.............. ,,	33 0 ..	40 0	18 0 ..	40 0
Fustic, Cuba ...... ,,	8 15 ..	9 10	9 0 ..	9 10
Jamaica .... ,,	8 10 ..	9 5	7 0 ..	7 5
Logwood, Campeachy ,,	10 0 ..	10 10	9 10 ..	10 0
Honduras ...... ,,	0 0 ..	0 0	6 10 ..	6 15
St. Domingo .... ,,	0 0 ..	0 0	5 15 ..	6 0
Jamaica .... ,,	6 2/6 ..	5 15/0	6 0 ..	6 2/6
Lima, first pile .... ,,	13 0 ..	14 0	12 10 ..	13 0
Red Sanders .... ,,	6 10 ..	0 0	5 17/6 ..	6 0

Notes and Queries

Correspondents will please observe that the Editor cannot undertake to send private replies to the class of queries which are answered in this page. He will be much obliged if readers will communicate items for this department as well as draw from it. All communications should give (in confidence) the name and address of the writer, though any *nom de plume* may be adopted. No query can be attended to in the current month which reaches this office after the 10th.

Soda Water.—An "aërated sherbet" may be made in the same way as lemonade, using orange syrup in place of lemon. The orange syrup may be made by dissolving, by the aid of a gentle heat, 2½ lbs. white sugar in a pint of orange juice, adding 2½ fluid ounces of rectified spirit.

R. B.—If the young man you refer to commences business as a chemist and druggist without having passed any of the examinations, he will be infringing the Pharmacy Act, and will be liable to a penalty of five pounds.

H. M.—We have never heard of Ung. Galeni, and cannot tell whether Ung. Gallæ is meant thereby, unless we had fuller particulars. If any chemist knows the ointment in question, perhaps he will kindly respond.

German Cherry Juice.—Some time ago we published an article on German cherry juice, which led to a good many inquiries, and would have led to business if the article could have been readily obtained. About that date the editor of the *Confectioner's Journal* (London) sent us the following formulæ, which were accidentally overlooked among our copy. They may come in useful in the course of the present year:—

Cherry Juices, Cherry Brandy, &c.

English Method used by Distillers, &c.—Take any quantity of small black cherries, pull off the stalks, and slightly bruise the fruit in a tub with a wooden hammer. Pour the whole into a cask and cover it over with a strong spirit, stirring up the whole body occasionally, but mostly for the first few days. The cask should stand upright, and be tapped before the cherries are put in, a small tap-basket being fastened inside to prevent the fruit clogging up the tap; this will be very black and strong. When wanted for sale, draw off 4 pints; add to it 4 pints of water and 1 lb. of loaf sugar, to form a gallon. More spirit or brandy may be added as the original is drawn off, until it shows weakness.

French Method.—Morella cherries, with their kernels bruised, 8 lbs., brandy, 8 pints; soak for a month. Strain the whole, squeezing the cherries at the same time. Add 1½ lbs. loaf sugar, called in France "Ratifia de Cerises."

The German Method is similar to the English, except that they use an immense number of wild black cherries in the process.

American Method.—To 4 quarts of brandy put 4 lbs. red cherries, 2 lbs. black, 1 quart of raspberries, a few cloves, a small stick of cinnamon, a piece of orange peel. Let the whole stand a month in a jar closely stoppered; then bottle it, with a lump or two of sugar to each bottle. More brandy may be put to the original bulk to draw the remainder of the juice.

Light.—The members of the homœopathic school who believe in the efficacy of infinitesimal doses must also believe in the necessity of keeping such medicines from the remotest contact with other medicinal substances. They believe the virtues of a drug are like the perfume of a flower—inappreciable in weight, but not the less specific in action. The illustration is a good one, but the weakness of the argument lies in the fact that there is no *proof* of the analogy. If true, there can hardly be any circumstances conceivable in which the specific action must not be interfered with. The less fantastic homœopaths are content to believe in the doctrine of *similia similibus curantur* without wasting their energies on the vain attempt to establish such transcendental dreamwork as the theories of infinitesimal doses and development of potentialities.

R. S.—Worm Tea.—

Spigelia	4 drachms.
Senna	3 "
Aniseed	1 "
Boiling water	16 ounces.

Infuse for an hour. Dose, from one to two tablespoonfuls every three hours.

Chilblains.—A correspondent of the *Lancet* recommends a solution of sulphate of copper (4 grains to the ounce) as an application for chilblains. He has found that succeed when everything else has failed to effect a cure.

Gentian omitted to "enclose his card," but had he done so we could not have helped him much. The ointment and the name chosen to represent it are evidently a piece of private property. It seems to contain a little oxide of zinc, and is slightly perfumed with bergamot.

H. M.—Pharmaceutical Chemists *only* are exempt from jury service. The extension of the privilege to other chemists has been proposed in the bills introduced by Lord Coleridge and Mr. Lopes, but parliamentary circumstances have hitherto prevented both from passing.

Scruple asks why Tinct. Arnicæ darkens by keeping, whether exposed to or protected from the light. It is frequently nearly straw colour when recently prepared, but becomes as dark as, or darker than Tinct. Calumbæ. Customers who have been served with the dark object to the light, and *vice versâ.* Have other pharmaceutists noticed this characteristic, and, if so, can it be remedied? The following is a formula for Arnica Opodeldoc.—

White Soap, 8 ounces.
Rectified Spirit, 1 pint.
Tinct. Arnica, ½ pint.

Dissolve by heat, and add

Camphor, 2 ounces.

You can prepare mercurous nitrate by dissolving mercury in nitric acid diluted with four or five times its weight of water.

J. A. T.—Syrups should be well boiled, bottled as hot as is safe to put them into bottles, and if possible in a number of small bottles quite full and well corked. They should be kept in a cool place. The crystals you complain of must be very curious ones, if hot water and patience will not remove them from the bottles.

N. T. O.—*Transparent Pomade.*—The following is a French recipe:—

Spermaceti, 2 ozs.
Castor Oil, 5 ozs.
Alcohol, 5 ozs.
Oil of Bergamot, ½ drm.
Oil of Portugal, ½ drm.

Melt together the spermaceti and castor oil, pour in the alcohol gradually, stop the heat, and add the perfume. Stir well, and pour into glass jars.

An American correspondent asks for a formula for Eau de Cologne, to be made from oils or extracts. The following is a simple form:—Dissolve one drachm each of oils of rosemary, bergamot, neroli, cedrat, and lemon in three pints of strong alcohol. A little cardamom seeds are sometimes added, and 5 drops of oil of amber will give a richness to the perfume after it has been kept a few months.

R. B.—Pharmaceutical chemists, not necessarily members of the Pharmaceutical Society, are exempt from service on juries. This includes coroners' juries as well as others.

G. H.—*Bandoline.*—Take of

Gum Tragacanth (choice) 6 ozs.
Rose Water, 1 gallon.
Otto of Rose, ½ oz.

Steep the gum in the water, agitating from time to time as it swells into a gelatinous mass; then carefully press through a coarse clean linen cloth, and incorporate the Otto of Rose thoroughly through the soft mass.

Nemo.—Of materia medica works the following are recommended in a circular issued by the Pharmaceutical Society: Percira's "Manual" (21*s.*), Royle's "Manual" (12*s.* 6*d.*), Garrod's "Essentials" (10*s.*). For pharmacy you would find Parrish's or Proctor's works of great value, or in relation to chemistry, Attfield's or Muter's treatise. The following has been given to us as a valuable liquid dentifrice:—

Take of

Fine potash soap	3 ozs.
Cream of Tartar	1 drm.
Alcohol, sp. gr. 0·910	18 ozs.
Distilled water of any desired perfume ..	6 ozs.

Digest and filter.

H. C.—In our number for February 1869, we published analyses of the chief hair restorers sold in this country, including those named by you. The result showed that nearly all of them contained sulphur and acetate of lead in varying proportions, say from half a drachm to a drachm of each to the half-pint, with a little glycerine.

R. F. C.—*Colourless Varnish.*—Dissolve 2½ ounces of shellac in a pint of rectified spirits of wine; boil for a few minutes with 5 ounces of well-burned and recently-heated animal charcoal. A small portion of the solution should then be filtered, and if not colourless, more charcoal must be added. When all colour is removed, press the liquor through a piece of silk, and afterwards filter through fine blotting-paper. This kind of varnish should be used in a room of at least sixty degrees Fahrenheit, perfectly free from dust. It dries in a few minutes, and is not liable afterwards to chill or bloom. It is particularly applicable to drawings and prints that have been sized, and may be used for gilding.